THE GEOGRAPHICAL JOURNAL

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ANTARCTIC ADVENTURE TODAY. *By Kevin Walton.*

Wednesday January 2 at 2.30 and 5 p.m.
SEARCH FOR A "DRAGON" IN INDONESIA. *By David Attenborough.*

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EXHIBITION

In cooperation with the Scott Polar Research Institute, Cambridge, an exhibition of Antarctic relics and equipment will be on view from December 31 to January 14 inclusive.

Tuesday, January 1 at 3 p.m.
AVIATION AND GEOGRAPHY. *By The Rt. Hon. the Lord Nathan, P.C., T.D., D.L.*

Monday January 7 at 8.30 p.m.
OXFORD EXPEDITION TO SARAWAK. *By Guy Arnold.*

Monday January 14 at 5.30 p.m.
BACK OF BEYOND. *Sound films.*

Monday January 28 at 8.30 p.m.
RECENT DEVELOPMENTS IN SOVIET CENTRAL ASIA. *By Lieut. Col. G. E. Wheeler (the Dickson Asia lecture for 1957).*

Monday February 4 at 5 p.m.
SURVEYING ANEROIDS: USES AND LIMITATIONS. *By B. W. Sparks, Colonel C. A. Biddle and R. A. Hamilton.*

Monday February 18 at 8.30 p.m.
CROSSING THE PATAGONIAN ICE CAP. *By H. W. Tilman.*

Monday February 25 at 5.30 p.m.
TRISTAN DA CUNHA AND GOUGH ISLAND. *Colour films with commentary by James Hall.*

Monday March 4 at 6 p.m. **(Please note time.)**
NEW CHINA. *Colour films with commentary by J. E. B. Hill, M.P.*

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EXPLORATION OF THE NORTHERNMOST ANDES. *By Allan Cunningham.*

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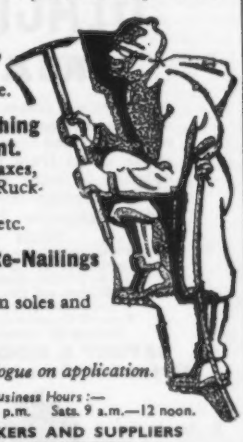

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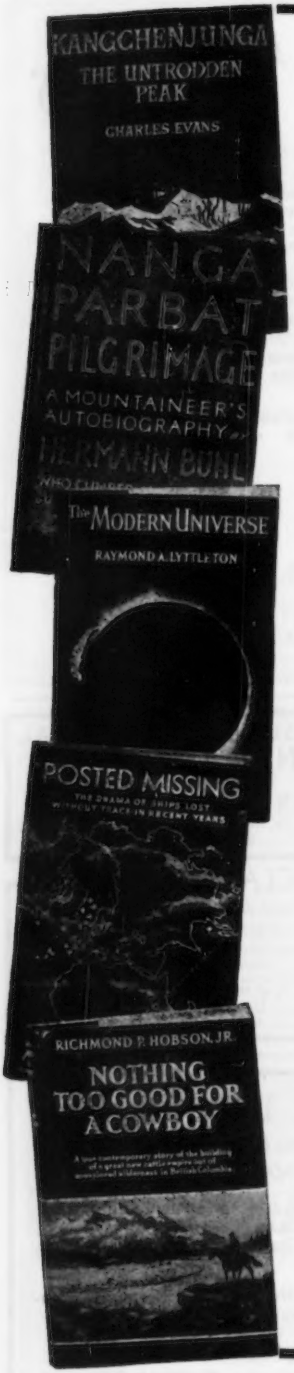

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The
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Vol CXXII Part 4 *December 1956*

ON THE CHARACTER OF CAPTAIN JAMES COOK

J. C. BEAGLEHOLE

JAMES COOK is a hard as well as an easy man to talk about, and character studies have an evil propensity to degenerate into hypothesis.[1] Everybody knows Cook's name; yet, I have always felt, extraordinarily little is known about him. He is an exceptionally difficult man to get inside. Certainly he was a great man. Put him next to any of his contemporaries of the eighteenth century, which was so very rich in great, and near-great, and interesting figures, and he does not suffer in comparison. He makes most of the politicians seem rather poor creatures, and the more I dig among the writers, and the artists, and the natural scientists, and the soldiers and the sailors and the scholars, the more I am convinced of the stature of his genius. He was not a tortured Titan, like Dr. Johnson; or charming, like Goldsmith; or witty, like Sheridan; or profound, like Henry Cavendish or Burke; or dashing, like Wolfe; he did not build an empire, like Warren Hastings, or maintain a vast correspondence, like Horace Walpole. Shall we then say he had a plain heroic magnitude of mind, and let it go at that? Or shall we give a list of the virtues taught by the sea, and picture him as a character out of a Conrad novel, a serious sailor, a survivor of typhoons, a large-scale rendering of Fidelity? No: because although he had that sort of mind, and was serious, and faithful, and came through, if not typhoons, at least a great deal of very bad weather, it is possible to be all that, and do all that, and yet be rather stupid; and Cook was by no means stupid. He had, in fact, a first-class brain, a really powerful intellect. He had some originality. I doubt whether he had subtlety. But I don't quite know. He was a late developer, and he was killed when he was fifty.

One of the difficulties is that he was, to use the old phrase, a man of action. That kind of man did not commonly, in his century, strew round him keys to his heart. He tended to rest on his deeds, if he survived them, and Cook did not even survive them. We can often find out something about a man from his letters. We can collect a fair number of Cook's letters, but apart from half a dozen to the Admiralty Secretary and his friend John Walker, giving an outline of his voyages, they tend to be of the order of his communications to the Navy Board: "Hon Gentlemen, Please to order His Majesty's Bark the Endeavour to be supply'd with eight Tonns of Iron

[1] This, with a few modifications, is the text of a lecture given in the lecture hall of the Royal Society of Arts, 20 June 1956, and sponsored by the High Commissioner for New Zealand, Sir Clifton Webb, who was in the chair. The documentation now supplied has been confined to material that is in most instances either new or little known.

Ballast"—which does not exactly throw a shaft of light into his inner life. I would give a lot for one good letter to his wife. I assume that he must have written to his wife, but we don't know even that. In any case, Mrs. Cook was a woman of propriety, and whatever she had, she made it impossible for us to have. I would give a lot for a few of her private letters to Cook. I know of one semi-formal fragment, of little use; and of what use are the return communications of the Navy Board, or those of the Victualling Board, or the Ordnance Board, or the other boards that went in for instruction, or information, or approval, or enquiry? His portrait was painted a number of times, and one ought to be able to learn something from portraits. I have gazed long, and with some intensity, at Cook's portraits, and I cannot say I have learnt much. The face in the picture by Nathaniel Dance has been called noble, and strong, and sensitive. It is a good and a strong face: beyond that, I confess, the longer I look the less I see. This portrait is, according at least to one man who knew Cook and admired him greatly, the surgeon Samwell of the third voyage, a good likeness and the only good likeness. On the other hand, Mrs. Cook did not wholly approve of it; she thought it looked stern, and Mr. Cook never looked stern. Never is a big word, and one must remember that for a good deal more than half of Mrs. Cook's married life her husband was removed from her sight, poor woman. There were occasions, I feel, when Cook might justifiably look stern. Still, there is her verdict, and it must have some validity, at least for the domestic scene. The portrait prefixed to the account of the second voyage, an engraving after William Hodges, the artist on that voyage, also shows a strong face, and an interesting one, but a considerable effort is necessary to reconcile it with Dance's picture. There is another portrait, allegedly by Hodges, in the Dixson Gallery, Sydney, N.S.W.; it presents us with a blue-jowled, rather sodden, spiritless person. The National Portrait Gallery picture, by Webber, the artist of the third voyage, is unlike any of the others except in its blue cheeks and chin: "Who," asked my wife on her first sight of it, "is that low villain?" So the artists don't help us much, with the possible exception of Dance.[1] Yet Hodges and Webber were competent men. I don't know that Reynolds would have been much better for our purposes. He would have given us Reynolds. Perhaps Gainsborough in his matter-of-fact mood? Perhaps Hogarth would have been the painter for Cook? But then Hogarth died too early.

We ought to be able to learn something about our subject from those who knew him and wrote about him in some considered and consecutive way. But they were few. His biographers never knew him. Those who did know him, and who wrote, were Samwell the surgeon; James King, who was on the last voyage, and wrote the third volume of the official account of it; John Reinhold Forster, the German naturalist of the second voyage, who drove everybody almost frantic with irritation; and Zimmermann, a seaman from the Palatinate on the third voyage. There is, in the account of that voyage, a panegyric by another naval officer, said to have been the Arctic voyager Lord Mulgrave. Mulgrave, however, had no personal experience of Cook's qualities as a captain. All these people agree about Cook's quality of greatness. Samwell's admiration, as he himself said, verged on idolatry. Forster did not fail to find fault with Cook, as he found fault with everybody else; and he pointed out that Cook had gained considerable credit which was really due to J. R. Forster, whose advice he had wisely taken. Zimmermann had but a distant view—he did not even sail in Cook's own ship. Nevertheless the lower deck has a

[1] Another, and better, portrait by Webber has recently come to light in private ownership; but it still does not carry as much conviction as the portrait by Dance which faces page 420.

way of finding out things. The lower deck has a pretty good estimate of the commander after being commanded for three years through all the circumstances of those voyages. It is on the lower deck that the legends grow: the one, for example, in Zimmermann that Cook always knew when land was near, and would come up on deck from his sleep to change the course accordingly when no one else, working and on watch, had the slightest suspicion. It is on the lower deck that the ballads are composed. If the gentlemen aft do not go in for legend, at least they are equally convinced of something essential, the extra quality, the touch that marks off this man from the rest of them—the greatness, in fact. They may vary in their estimate of individual characteristics. Both King and Samwell, for example, noticed what they called Cook's temperance—which one may well think of sometimes as a sort of self-immolating asceticism. Samwell thought it was a virtue. King could hardly think that: self-denial was a matter so perfectly indifferent to the man, he held, that it did not emerge as virtue at all. Here I may advert to another facet of virtue. On his second voyage Cook rediscovered the island of Tonga. It was part of the grand strategy of Tonga to offer him, for his delectation, the disposal of the female youth and beauty of that island; and it was the matrons of Tonga who cast the gravest aspersions on his manhood for his discouraging behaviour in the matter. He was old, they said; broken-down; he was good for nothing. Are we to presume, then, that our hero was blankly insensitive to the elementary pleasures of life? I think not. The indications are on Samwell's side: Cook always kept a good table when he could; he might, with a sort of cussedness of austerity, insist on eating a fish suspected to be poisonous—and suffer for it—but towards the end of his second voyage he confesses frankly in his journal that though he is not really fond of boiled penguin, at least it is preferable to salt beef and salt pork, and he is really sick of them. As for women, I imagine that if there were a Muse of Hydrography, he would have been thoroughly satisfied with her and Mrs. Cook.

What qualities besides temperance do we find touched on in the more formal tributes? Strength and capacity of mind, sense of duty, mastery of seamanship, humanity, persistence, foresight—all the virtues one would expect; and, in Samwell, not merely austerity, but something perhaps surprising in what is beginning to look rather like a monument, affability of conversation. Why did nobody leave a record of Cook's conversation, even of one affable sentence? Boswell met Cook in 1772, and more than once later, and was much impressed; he made the Captain a present of a copy of his 'Account of Corsica,' with a lavish inscription on the fly-leaf; but not a word does he report of what the Captain said to him.[1] Lest you think the monumental aspect still rather overwhelming, I add that there is general agreement that the Captain's temper was rather short, though his anger was short-lived too. I add also that if you get away from the formal tributes, and care to scrutinize carefully the logs and journals or other records of those who sailed with him, you will find examples of that invaluable thing, the revealing detail. Men sometimes say why they admire, or are puzzled, or distressed. We know, for example, that Cook once swore with considerable abandon—not that that puzzled or distressed any seaman. I am happy to know that he swore.

All this does, I think, indicate something about our man. It does not necessarily indicate complexity, but it does bring us hard up against the necessity of studying the man himself, as directly as we can. In the end, as he was a man of action, we have to be clear both about what he did, and how he did it, and, as he was com-

[1] Not directly, that is; but in his *London Journal* for 1776 he notes more than one meeting with Cook, and the general drift of the conversation. (Private papers of John Boswell, vol. 11.)

mitted in the course of his professional life to keeping journals, what he said about it. And as he was a conscientious man about these journals, we have not merely to read between the printed lines, but to go to the originals and study the deletions and alterations, the drafts and the second thoughts, the doubts and surmises as well as the decisions, the blots as well as the fair copies. What then did he do?

I need merely remind you of the outlines of Cook's life. He was a Yorkshireman with some Scottish blood. He came from a very low social class, the son of a day-labourer on a farm not far from Whitby. The father had enough ability to rise to be a farm-bailiff, the son enough to ensure his attendance at the local school. He worked about the farm; his intellectual promise was such that it seemed he might make a haberdasher; from the haberdasher's counter he graduated, under his own impulse, to an apprenticeship in the coal trade out of Whitby. This was important; Cook was not the only seaman who started in the coal trade and went on to a distinguished career; and it was important that his master was the Quaker John Walker; for Walker looked after the youth and encouraged him in the study of mathematics and navigation. It does not seem that he ever read much else; we have at any rate no record of adventures in polite literature. He rose in this arduous service: his ability was clear to Walker, and by the time he was twenty-eight he was offered the command of a collier. The nature of the service, again, was important; it was in the North Sea, up and down the unlighted, shoal-begirt, gale-smitten east coast of England, in and out of tidal estuaries; broken by a voyage or two to the Baltic, which also had its coastal dangers. Why was this so important, for a man who was to sail over so much deep water, looking for land that did not exist? Because apprenticeship in the coal trade was also apprenticeship to the east coast of Australia and the west coast of North America and the barrier-reefs of the Pacific; because the North Sea fogs were a training in the fogs of the Atlantic and the Antarctic and the Arctic; because Cook came to maturity on a lee-shore, as it were, with the lead-line as one of his principal tools of navigation. He did not, with this training, take the command that Walker offered him; he volunteered into the Royal Navy as an ordinary seaman. We should like a statement of his reasons. He did not state them—beyond saying that he had a mind to try his fortune that way. Perhaps he wanted to see the world; perhaps he wanted to widen his experience; perhaps he was even urged on by some wish to serve his country, which would be unusual in that press-gang ridden age; he may simply have been ambitious, without guessing where ambition might take him. At any rate, he volunteered just as the Seven Years' War was breaking out. He saw Channel service. In a few months he was promoted master's mate, and then master; he crossed the Atlantic and was one of the men responsible for sounding and charting the St. Lawrence river before the fleet went up with Wolfe's men for the assault on Quebec; and on the American station he had a period of wintering at Halifax that gave him a chance to read more deeply in mathematics and in astronomy, the foundations of the higher navigation. More, he met a military engineer famous in his day, Samuel Holland, who introduced him to the theory and practice of surveying, and his interest was thoroughly aroused. When Cook's interest in a subject was aroused, he pursued it with passion. His charts became known; the commodores and admirals began to take notice, and shortly after the war Cook had his first independent command. It was not a large vessel, it was the schooner *Grenville*, in which he crossed the Atlantic year by year to survey and chart the shores of Newfoundland. It had a small crew; but it is significant that when Cook took his next command almost the whole crew went with him.

By kind permission of the National Maritime Museum

Captain James Cook, by Nathaniel Dance, 1776

His next command was in 1768. Mr. Cook—he was, nearing the age of forty, still only a warrant officer who had been doing a specialized job with superb efficiency, and not taking time off to look for promotion—was picked on to take a small vessel out to the South Sea with two astronomers to observe the great phenomenon of 1769, the transit of Venus across the disc of the sun. This was in origin a Royal Society enterprise, to which the Crown was lending aid and comfort; and Cook, who had already had his observations of an eclipse of the sun published by the Society, found himself one of the astronomers. The Admiralty decided to tack something else on to this limited mission and, after it was over, to send the ship exploring.

There is still a little obscurity surrounding the choice of Cook for the command, and there were some hurt feelings in another direction. It was indeed, in a way, a surprising appointment; for the commanders on the two previous English exploring voyages in the Pacific had been a commodore and a captain. Rank, however, in all this proved quite irrelevant; Mr. Cook was made a lieutenant in May 1768, when he took over the *Endeavour*; and if we wish to be pedantic, we may remember that he was Captain Cook in rank, and not only by nautical courtesy, for less than the last four years of his life. Irrelevant? Quite irrelevant; for it is here that the element of greatness begins to make itself felt.

I do not mean that in any portentous sense. It would be easy to say that "Cook saw his chance and seized it." But it would also, I think, be quite wrong to say so, to force drama into a purely undramatic situation. No doubt Lieutenant James Cook had an appropriate lifting of the heart as he trod the deck of his own command and reflected that he was bound for a two years' voyage, but he was not a man who dealt in drama. He did not like chance. When he had to seize a chance or perish, as he did once or twice, he seized it all right; but I have the impression that he regarded being in a position where he had to seize a chance as something rather ignoble, something forced on him that he ought to have been able to avoid, a mark against his professional competence, for which he should apologize. He believed in careful planning, in the elimination of chance. But of course in 1768 he still had a good deal to learn. The significant, the highly important, thing is that he was equipped to learn it. This is a thing that marks him off from his predecessors. He went on to learn, and he went on to utilize what he had learnt, over something like 200,000 sea-miles, heaven knows how many thousand miles of hitherto unknown coast-line. He did not know—how could anybody know?—that when the *Endeavour* sailed from Plymouth on 25 August 1768 it was the beginning not of one voyage but of three voyages that were going to change the face of geography and a number of other departments of human learning, as well as to affect the politics and strategy of empires. I must, however, myself avoid the dangers of drama—or of melodrama—and state succinctly and soberly what happened.

Cook was instructed to take the astronomical expedition to the newly discovered Tahiti and to make the proper observations. He did it. He was instructed to sail south from Tahiti to lat. 40° to see if he could find a continent, and if he could not, to sail west and pick up New Zealand. He did it. He was instructed to establish good relations with native peoples, to take soundings, chart coast-lines and harbours, to make observations of most things under the sun as they appeared on any new countries he should encounter, and to enter his observations in a journal. He did all this. He was then at liberty to come home round either Cape Horn or the Cape of Good Hope, as he thought best. His idea of "best" was to come home round the Cape of Good Hope, taking in the discovery and exploration and charting of the

The death of Captain Cook.

Watercolour by John Cleveley, after a sketch by James Cleveley, carpenter in the Resolution.
By kind permission of Mr. Sidney Sabin, Sabin Gallery, 4, Cork Street, W.1

whole east coast of Australia on the way, up to the East Indies and down across the Indian Ocean. That, with the solution of the problem of whether there was a strait between Australia and New Guinea, was thrown in for good measure; he had already got Tahiti and the Society Islands and a number of other islands, as well as New Zealand, fixed with some accuracy in their places and charted. He presented the Admiralty with astonishment and with a plan for a second voyage, on which it was scarcely possible to send any commander but himself. This was in 1771. The plan for the second voyage was to sail round the world in as high a latitude as possible, making great sweeps north and south, to ascertain finally the existence or non-existence of the large southern continent that geographers were fond of deducing in that hemisphere. This was to be done by sailing west to east in the great southern wind-belt, plunging south first from the Cape and making use of two bases in New Zealand and Tahiti. It was a tremendous plan. Between 1772 and 1775 Cook carried it out, incidentally rediscovering and putting accurately on the map, in their proper relations, almost all the Pacific island groups discovered before him since the sixteenth century. He deliberately lengthened this voyage by a year, and having sailed from New Zealand to the Horn, took another plunge into the South Atlantic, to discover South Georgia and the Sandwich group, before he reappeared with his circumnavigation done at the Cape. If you look at his track, you will see that he had made very effective work of the southern continent. There was in fact a continent, as he concluded, though he had not seen it, but it was something very different from the continent of theory. It was Antarctica, and Cook's navigation of the Antarctic ocean, with its fogs, its storms, its bergs and pack ice, was—to put it mildly—a very remarkable feat of seamanship. He practically wrote his own instructions for this voyage, and though it is just as well to be chary of superlatives, I suppose that in conception, detailed planning, and execution it was the greatest single voyage in the history of the world. When it was over Cook was given a vacant captain's berth in Greenwich Hospital. But before it was over the Admiralty had thought of another voyage, another problem to be solved. This time it was the North-west Passage, approached from the Pacific, and sought in a close examination of the North American coast from California as far north as it was possible to go. If only the tempters had withheld their hand for a year or so, for Cook was in need of that snug berth at Greenwich. But they dangled the bait, and it was taken, instantaneously. The plan, the detail, the timing, once again became Cook's. Once again he would go into the ocean by way of the Cape and New Zealand: he would make Tahiti his sole base, for wintering and refreshment, and on the American coast he would see what he would see. He would certainly examine it narrowly. Geographically, Tahiti was too far south for the utmost value as a base on this voyage, and Cook, when he discovered Hawaii on his passage north, must have been struck at once with the possibility of its alternative use. The question was one of time. He worked his way up the American coast, and well beyond Bering Strait, landed on the Asian as well as the American side of the strait on his return south, correcting old charts and charting anew, and then decided for Hawaii, that he might have the maximum period of spring and summer for a new thrust north. At Hawaii, forced to put back for repairs after already leaving his port of refreshment, he was killed on 14 February 1779, in a wretched scuffle that ought never to have occurred, as if Chance were taking its revenge on a man who had so often eliminated it. But he had already eliminated the North-west Passage as a useful proposition.

These, put briefly, are the things that Cook did, in a geographical, an exploratory

sense; and we can already see something of the scope, perhaps even of the texture, of his mind. He could think broadly, and he could work in detail. I am sorry I cannot illustrate this; but if you follow his careful supervision of his ship when fitting out, and the attention he paid to her stores; if you note his determination at Madeira to load not merely wine, the conventional cargo, but onions; if you correlate this with his fanaticism in hanging on to the North Cape of New Zealand through day after day of frustrating storm till he could get its position precisely fixed, and with his constant practice of lunar observations to get his longitude; with the exactitude of his charts; with his careful thought over the human problems of his contact with people of other races; with his willingness to use other men's words and other men's knowledge when they are better than his own; with what I can only call his passion for professional veracity—you will see what I mean. The combination of breadth and detail brings up another point, about Cook's treatment of his instructions. His predecessors had a pretty cavalier way with their instructions; you might almost call instructions their point of departure. The remarkable thing about Cook, on the other hand, is that he carries his instructions out: literally, meticulously. That is one reason why he staggered his official superiors. What made the difference? One of my hypotheses has been that he belonged by birth to the class that took orders, that his whole training was in conscientious obedience to orders, and that his serious Scottish-Yorkshire blood reinforced this literalness. To have fallen short, for whatever reason, would have been dishonest, a sort of mutiny; and men were rightly flogged for mutiny. But that hypothesis does not go far enough. For, granting the literalness, Cook has his own point of departure. He does, thoroughly and exhaustively, all he is asked to do, and writes it all down in his matter-of-fact way. This is the point where the ordinary first-rate man would go home. It is the point where Cook says to himself, "Well, my ship still floats, my men are still healthy and able-bodied, what shall I do now?" The careful planner, the master of detail, the genius of the matter-of-fact, suddenly seems to lack all sense of proportion; his ruling passion seems to be a passion for the work of supererogation. You cannot say that he is disobeying his instructions; he would have been horrified at the idea. He is simply adding to their logic; not much, he would say, but there, the thing was calling out to be done. He used an illuminating sentence in 1775 in a letter—not an intimate letter, to be sure—to a young French admirer who wished to go voyaging in the Pacific. "It seems certain to me," he wrote, "that the man who does no more than carry out his instructions will never get very far in discovery." [1] I think I should remind you that this remark was made not in an age of radar and echo-sounding and helicopters, and all the other high-powered aids to navigation, but in the eighteenth century, after the first voyage on which the chronometer was used, with astronomers working all the time to verify the chronometer's utility.

We can join to this a more personal note, one of the few personal notes in the journals. Here I come to what he wrote. It refers to the date of Cook's farthest south, 30 January 1774, when, in lat. 71° 10′, he was finally held up by the pack ice. "I will not say that it was impossible anywhere to get in among this Ice, but I will assert that the bare attempting of it would be a very dangerous enterprise and what

[1] Cook to Latouche-Tréville, 6 September 1775. The letter, in French (I do not know who translated it for Cook), is quoted by E. T. Hamy, in his article "James Cook et Latouche-Tréville . . .", *Bulletin de géographie historique et descriptive*, 19 (1904) 207–8. Original of the passage quoted in English is as follows: "Je soutiens que celui qui ne fait qu'exécuter des ordres ne fera jamais grandes figures dans les découvertes."

I believe no man in my situation would have thought of. I whose ambition leads me not only farther than any other man has been before me, but as far as I think it possible for man to go, was not sorry at meeting with this interruption. . . . Since therefore we could not proceed one Inch further South, no other reason need be assigned for our Tacking and stretching back to the North. . . ." [1]

"I whose ambition leads me . . . as far as I think it possible for man to go"—our man, then, is human; he is implicated by a personal interest. Are we to take it that the words I have quoted show that he has a sense of proportion as well? Do we simply have to go down to lat. 71° 10′ S. to get the resolution of our paradox? In this context again, that of the sense of proportion, we can take a phrase that Cook uses in certain circumstances both on his first and his second voyages: "I was unwilling," he says, "to spend time searching for what I was not sure to find." Is not this a regrettable lapse, an attitude hardly characteristic of the best explorers? It certainly raised the fury of one of Cook's critics, the geographer Alexander Dalrymple. My answer is "No," it was a very sensible attitude, an imperative attitude for a man in Cook's position: he had his objectives sorted out; he was always ready to reconsider the minor ones; but any change must be made after due thought, on a balance of goods; and into the balance went not merely desirable footnotes to knowledge but other considerations, winds and weather and time, and the margin left for non-calculable elements.

From all the foregoing, I think, emerge two very strongly marked characteristics of Cook's mind: its scepticism and its elasticity. In his trade of explorer—you see this again and again in his actions and in his draft journals—he had the utmost difficulty in taking anything on trust. That frequently meant extra work for his men. Also he liked to have essential resources in reserve, in case the extra effort was needed. But with his own mind ready for anything, he sometimes preferred to wait on the possibilities, rather than do too much talking. His men were therefore sometimes taken by surprise. I have mentioned the work of supererogation. Here is a passage from the reminiscences of one of his midshipmen: it refers to a time on the second voyage when, on board the *Resolution*, a number of people were beginning to feel they had had enough. The ship had left the base in New Zealand.

"At this time we all experienced a very severe mortification, for when we were steering East, we had all taken it into our heads that we were going straight for Cape Horn, on our roud [*sic*] home, for we began to find that our stock of Tea, Sugar &c began to go fast, and many hints were thrown out to Captn Cook, to this effect; but he only smiled and said nothing, for he was close and secret in his intentions at all times, that not even his first Leiutenant knew, when we left a place, where we should go to next. In this respect, as well as many others, he was the fit [test] Man in the world for such a Voyage: In this instance all our hopes were blasted in a Minuite, for from steering East, at Noon, Captn Cook ordered the Ship to steer due South, to our utter astonishment, and had the effect for a Moment, of causing a buz in the Ship but which soon subsided." [2]

Under Cook there was nothing for a "buz" to do but subside.

The more I think about it all, indeed, the more I am inclined to see in Cook's mind a third characteristic, as strong as, and perhaps underlying, the scepticism and

[1] The passage is famous: I take the exact form of words from their first version in B.M. Add.MS 27, 886.

[2] "Memoirs of the early life of John Elliott," B.M.Add.MS 42,714, f.24.

elasticity. That is his patience—which may sound odd when I have already referred to the well-attested shortness of his temper. Only a fundamentally patient man could have waited as long as he waited for the precise result. Only a fundamentally patient man could have studied seamen and savages as closely as he did; or, singly and unarmed, have risked his life so deliberately and so repeatedly to get on good terms with those savages. Only a fundamentally patient man could have refrained from throwing J. R. Forster overboard, and have merely shown him the door. I do not at all discount the contrary instances. They stand out clearly enough not to allow of discount. But really to understand our man you have to recognize the patience—not exactly a passive sort of thing, but an active working part of his temperament. I have doubted whether he had subtlety. It is certain, on the other hand, that he was not at all a simple man; not at all, as I have said already, a captain out of Conrad.

To leave such analysis, let us consider something for which Cook is widely known: I mean the preservation of his seamen's health. We have here again an illustration of his capacity for detailed administration, added to broad planning, and to his forethought over a base. It is one broad aspect of something larger, his humanity. Cook was not a sentimentalist; he does not break down into individual acts of tenderness; so far as I can remember, there is only one expression of what we may call love in all his journals, when his surgeon in the *Resolution* on the third voyage, Anderson, dies of tuberculosis. But the humanity that is kindness, understanding, tolerance, wisdom in the treatment of men, a quality practised naturally as well as planned for, is what gave Cook's voyages their success, as much as the soundness of his seamanship and the brilliance of his navigation. It went with some sternness (we must overrule Mrs. Cook here), some flogging, a disposition to experiment, and a good deal of the psychological insight that comes from practical experience. It was founded also on the patience to which I have already referred. If there was any trace of inhumanity in him, it was exercised on himself. You would never guess from his journal that at Batavia, in the awful last weeks of 1770, he had gone down with the virulent malaria that then prevailed, and while his passengers, Banks and Solander, hired nurses and a house in the hills, and had Cook's servant, specially sent, to wait on them, Cook remained on board working. You would never guess, from his casual mention of indisposition, that on the second voyage, quite independently of eating poisoned fish, he was for some weeks desperately sick, and his life for days despaired of. Such personal trivia, he seems to have thought, were not at all the proper ingredients of a journal of discovery.

This question of humanity is quite a complicated one. We may go back first to the point that led us to it, the welfare of seamen. The great enemy of health at sea was, of course, scurvy. Cook was not by any means the first to worry about scurvy, or to see that there was something wrong with the seaman's diet. He was not the inventor of the dried soup, or the various other mixtures and essences with which the Admiralty was experimenting. He did not see any special advantage in citrus fruits. His great contribution to the subject was his realization that what was needed was fresh food in general, and clean water, and, as a counter to depression, variety of food; and, as another contribution, cleanliness of person, clothes and quarters; and, as an aid to that, a dry and disinfected ship. His men were always emptying and refilling water-casks, gathering wild celery and coconuts; the first task at any populated island was always to trade for hogs and fowls and fruit, and not to give the men their heads with curios and women. Cook was always ringing the changes on the beer and wine and spirits allowed as drink by the Government;

always brewing what was called "spruce beer," from the foliage of the spruce tree or any tree like it. And he would not stand too much conservatism from his crew; he flogged a man at Madeira, at the very outset of the first voyage, for refusing his ration of fresh beef. That was an exceptional sort of encouragement. He hit on a better method with sour krout, and the words with which he describes it are enlightening both about himself and his men:

"The Sour Krout the Men at first would not eate until I put in pratice a Method I never once knew to fail with seamen, and this was to have some of it dress'd every Day for the Cabbin Table, and permitted all the Officers without exception to make use of it and left it to the option of the Men either to take as much as they pleased or none atall; but this pratice was not continued above a week before I found it necessary to put every one on board to an Allowance, for such are the Tempers and dispositions of Seamen in general that whatever you give them out of the Common way, altho it be ever so much for their good yet it will not go down with them and you will hear nothing but murmurings gainest the man that first invented it; but the Moment they see their Superiors set a Value upon it, it becomes the finest stuff in the World and the inventer a damn'd honest fellow." [1]

Patience again, you see. This is not the only meditative passage of the sort in Cook. Sailors were queerly conservative people. Spruce beer was generally thought a pleasant drink; but there were some, says Lieutenant Clerke, who "dislik'd it vastly—prefer'd water to it—but I believe 'twas more caprice than any absolute distaste to it." [2] The beer was drunk and those conservative men, who had fled to water, in the end even went out looking spontaneously for green vegetables. That, for their captain, was a real triumph.

Cook had another rule if there was any danger of shortage. "Whatever refreshment we got that would bear a division," he says, writing about the enforced period spent in the Endeavour river on the Australian coast in 1770, "I caused to be equally divided amongest the whole compney generally by weight, the meanest person in the Ship had an equal share with myself or any one on board, and this method every commander of a Ship on such a Voyage as this ought ever to observe." [3] Officers who sailed with him for the first time were very much impressed. "Our people all in good health," notes the master of the *Resolution*, at the Cape in 1772, "having been so from our sailing from Plymouth Sound from the great care and attention of our Capt." [4] In the realm of public health, my mind dwells on another scene, unusual, so far as I know, in the naval history of the time. Clothing, on the second voyage, was showing signs of wear; so, says a journal-keeper, "The Captain gave the People needle and thread, at the same time examined their hands—those who had dirty, suffered the usual punishment (the daily allowance of Grog stopped)." [5] It is a pleasing picture, this parade of eighteenth century tars meekly displaying palms and knuckles for inspection, and the dreadful sanction hovering above them. On Captain Cook's ships, said commanders who were less devoted to hygiene—to whom a clean crew had somewhat an aura of festival—it was always Sunday. There was sometimes, it must be admitted, a little querulous-

[1] 'The Journals of Captain James Cook' (ed. J. C. Beaglehole), I, p. 74.

[2] But, after all, beer was beer, and the dissenters were in a minority. P.R.O. Adm 55/103, 5 April 1773.

[3] 'Journals,' I, p. 366.

[4] Gilbert, P.R.O. Adm 55/107, 17 December 1772.

[5] The midshipman Bowles Mitchel, P.R.O. 51/4555, 6 March 1773.

ness. Mr. Pickersgill, third lieutenant in the *Resolution*, inclined to have a grievance. He had one just before the ship arrived at the Cape. "The Cask of Beer on Deck ordred to be bung'd up so that no one must drink no more to night." It was alleged that the officer of the watch had let this invaluable liquid run about the decks. Mr. Pickersgill (whom I suspect to have been the officer of the watch) had never seen it run about the decks. He suspected a plot: for, it is to be understood, when the beer was gone the sailors were to get a ration of wine. "As a Purser the Captain [Cook was his own purser] knew how to Prolong it which he endeavours to do till Past 12 in order to save the days allowance of wine by the Ships Company—this was seen thro by the People who drank it out as soon or nearly as soon as it was broch'd which Baulk'd the Affair—The Beer was Experimental beer sent out by Goverment to make trial of and not Kings Allowance Querry wheather they had not a right to wine and bear both; or wheather Govermt design'd it as a Perquesit to the Purser." [1] I do not know of any other accusation of fraudulent self-emolument levelled at Cook.

He was threatened by another sea-lawyer, after the first voyage, with an action for wrongful flogging. The proceedings were smothered somehow, which is regrettable, because they might have been useful to us. The matter is relevant when we are enlarging on Cook's humanity. If you read through the logs of the voyages quickly, you may be startled by the number of floggings reported therein, and you may be rather appalled by the indignity put upon your fellow human beings. Is this the humane Captain Cook, you may ask, who had to flog his sailors round the world? There are a number of observations to make in answer to that question. In the first place, we are dealing with the eighteenth century, with H.M.S. *Endeavour* and H.M.S. *Resolution*, and not H.M.S. *Pinafore*. Secondly, if you work out the number of floggings in relation to the three years' length of a voyage, you will find that they are not so many. Thirdly, you will find that the individual flogging, compared to the standard of the age, was not severe—generally, indeed, it was astonishingly mild. Once or twice only, a man got two dozen lashes, spread over two successive days, for the grossest disobedience or dereliction of duty. The standard punishment was a dozen, sometimes reduced to half a dozen. What were these punishments inflicted for? For drunkenness and refusal to obey orders, for insolence to officers or petty officers, for a number of unspecified sins summed up in that vague term "mutiny," for attempted desertion, for the quite unforgiveable loss of weapons by sentinels on shore, whose idea of duty was to go fooling with native girls. There were other unforgiveable offences: dirtiness between decks, or the dirtiness of the man who made it a practice to throw his chewed quid of tobacco into the ship's food while it was cooking; or the bullying or other maltreatment of native peoples. This last has great importance, obviously; and it may be remarked that one of the few occasions when Cook's men thought—to use the language of one of them—he "lost sight of justice and humanity," was when he fell with fury on a nervous marine who had shot a native on the beach at Tanna, in the New Hebrides. I need not elaborate this particular incident. Good relations with, let us say, the Polynesians were essential for the smooth running of voyages that depended on Polynesian bases, and it is not beneficial either to be too nervous or to bully your hosts. They might have their own sins—they were, for example, embarrassingly expert thieves—but they had to be borne with. Cook, very rarely, and for sufficient reason, had a native flogged. He was careful to make his justice and his moderation crystal clear. His practice was based on the most elementary

[1] P.R.O. Adm 51/4553/205, 17 September 1772.

prudential motives. There is no doubt at all that it was based also on a real feeling for human rights and decencies, on a real sympathy for the position and way of life of the island peoples. He gave much anxious thought to the working out of his policy of friendly investigation when people were hostile, unequivocally or equivocally. There were, inevitably, some fatal encounters, and his distress and self-examination then are very illuminating. His determination to keep venereal disease away from the islanders is illuminating too, and his worry when he found he was beaten. He was dealing with human material, after all, and you can see a case for severity. Yet, as a comment on severity, I put before you the case of John Marra. Marra was an Irishman, and one might almost say that his hobby was desertion. In 1770 he had somehow landed up in the East Indies; I imagine he had jumped his ship there. He volunteered into the *Endeavour* at Batavia when Cook was rounding out his depleted crew, and sailed again on the second voyage. He deserted as early as April 1772, three months before the *Resolution* departed from England, and was haled back. When the ship was leaving Tahiti, on 15 May 1774, he slipped overboard. Cook brought to, lowered a boat, and picked him up; he jumped out of the boat and started swimming again; he was dragged on board and put in irons. Was he flogged? No; he was kept in irons until the ship was clear of the islands, and then released: "for"—I quote Cook—"when I considered the situation of the Man in life I did not think him so culpable as it may at first appear . . . I never learnt that he had either friends or connections to confine him to any particular part of the world, all Nations were alike to him, where then can such a Man spend his days better than at one of these isles where he can injoy all the necessaries and some of the luxuries of life in ease and Plenty." [1] Is not this judge imaginative as well as merciful? It is but fair to add that when, six months later, Marra tried to desert again, in New Zealand, he got his dozen; but even then, Cook said, he would have let him go, if he was not well assured that the fellow would have been killed and eaten before morning.[2] In justice to Mr. Marra, I should add that he himself insisted he was only going on shore to see a lady.

With all the qualities that I have rehearsed, how was it then that Cook met his end when he did, as he did, in an affray with Hawaiians, men with whom he had previously been on quite good terms? It is the great irony of Pacific history, and one could devote almost a book to the narrow analysis which the answer requires. Put briefly, there were faults and misfortunes on both sides. I am sure that Cook should not have been on that third voyage at all; or that, if the Admiralty wanted Cook to command it, it should have been postponed a year or two. At the end of the second voyage the man had had seven years of the most intense responsibility, nerve-racking for months at a stretch, problem succeeding problem, with every faculty extended. His time in England he devoted to fitting out new expeditions. His constitution, physically and mentally, was enormously strong, but he had almost died of what he chose to call his "bilious cholic"; and if by July 1775 he was not physically and mentally exhausted, and if he himself would have laughed at that supposition, at least he needed a period of prolonged rest. I think it is true that on the third voyage he was not consistently quite the man he had been. He did not go after island groups with the same fresh elasticity of spirit. The sternness was a little more evident, the quick temper not so consistently damped down. His officers were rather distressed by the new punishments his exasperation inflicted on island thieves. It was the theft of a boat that provoked his last visit on shore—a

[1] B.M. Add. MS 27,886, 15 May 1774.
[2] Elliott, Add. MS 42,714, f.35.

visit in which he generously took the place of his subordinate Clerke, who was weary with the disease that was in a few months to kill him. The plan was to take a chief as hostage—a peaceful operation which had often succeeded before. But this time there were complicating factors beyond Cook's management, of which he did not even know. The chief would not come; the crowd grew menacing. Cook's temper suddenly loosed and he shot a man dead; and then it was the turn of Hawaiian tempers. Cook immediately regained control of himself; his last gesture, as he was struck down into the water on the beach, was to his own men to stop firing, as may be clearly seen in the contemporary picture facing page 421. Here at last, if you like, is the drama I earlier denied to Cook—the tragedy, crammed into a few minutes, of the great man betrayed by the tiny flaw in his greatness. As human beings, we may be grateful for a flaw; but why did it have to show at that moment?

I should like to end in a rather different strain. There are many revealing passages I should like to quote from Cook's own logs and journals, but quotation takes time, and I shall content myself with the words of two old men, both of whom had known Cook in their youth. The first was John Elliott, who had sailed in the *Resolution* in 1772 at the age of fourteen. He made a chart showing the ship's track, which he was rather proud of. Alas! like all other records it was impounded at the end of the voyage. But Cook asked Elliott, now a mature youth of seventeen, to breakfast, and promised him he should have the precious document back. Says Elliott in his memoirs, "I attended to his invitation, and did recieve my Chart &c with my Name *Elliotts Chart and Ships Track*, written on it, in his own hand, and which writing I venerate to this day, and can never look at Without feeling the deepest regret at the melancholy loss of so great a Man." [1] The second was not an Englishman, or a seafarer, or a hydrographer, or a theoretician about continents. In November 1769 the *Endeavour* visited a pleasant spot on the east coast of New Zealand called Mercury Bay. There were a number of Maori children there, including a small boy, one Te Horeta. In the next century Te Horeta, an ancient hook-nosed warrior with much blood on his hands, was fond of reminiscing about that November.[2] The small boys thought the English sailors must be goblins, although they were amiable goblins. "There was one supreme man in that ship. We knew that he was the lord of the whole by his perfect gentlemanly and noble demeanour. He seldom spoke, but some of the goblins spoke much. But this man did not utter many words," said Te Horeta; he liked to feel the Maori cloaks, and handle their weapons. He took the small boys out to the ship, and gave them biscuit, and he gave Te Horeta a nail, which Te Horeta was very fond of, and mourned over greatly when it was lost. "He was a very good man, and came to us—the children—and patted our cheeks, and gently touched our heads." And Te Horeta would repeat the old Maori proverb: "A *rangatira*—a nobleman—cannot be lost in a crowd."

[1] Elliott, Add. MS 42,714, ff.48–48v.

[2] Te Horeta's story is given most fully in John White, 'Ancient History of the Maori,' V, pp. 121–8.

PROBLEMS OF DEVELOPMENT IN NEW GUINEA

O. H. K. SPATE

MOST AUSTRALIANS seem to take their control over half of the world's second largest island very much for granted, apart from sporadic demands for a "development" vaguely specified but generally implying large-scale European settlement—in fact, a White Melanesia before we have fully settled White Australia. Here indeed is the crux of the New Guinea problem. That 9,000,000 people should hold an entire continent of 3,000,000 square miles, lying next to crowded Monsoon Asia, may appear an anomaly; but it is by no means without justification. But in the long run the extension of Australian control over a region so manifestly un-Australian in character (even though also un-Asian) as New Guinea, can only be justified by the effective exploitation of its physical resources and by the advancement of its peoples; and in this view the development of New Guinea is of very material concern to Australia.

Like Australia, New Guinea is on the whole a difficult country; but area for area it has probably a greater potential. This is at least suggested by the fact that the 183,000 square miles of the Australian half support a native population of about one-and-a-half million—probably five times the aboriginal population of Australia at the coming of the white man, and this at a far higher level of material culture. Yet after three-quarters of a century of European contact and control, the actual economic contribution of New Guinea remains slight. The core of New Guinea is the Tertiary central cordillera, up to 16,000 feet high, running the entire length of the island, and including broad grassy vales and plateaus which appear to offer admirable conditions for European settlement. South of this is a foothill zone, largely very wild limestone country and everywhere covered by dense tropical forest, succeeded in the great southern bulge by the swampy jungles of the Fly and Digul rivers and then again by the low Oriomo plateau, relatively dry and covered by poor grassland and scrub. The whole of this south-western quadrant of Australian New Guinea is poor and difficult country, on the limestone foothills and the wildly dissected flanks of the cordillera almost impenetrable. Further east the narrow coastal plain and its embayments into the hills offer more scope for both native and plantation agriculture.

To the north, the cordillera is flanked by a great depression, which in the Australian half is occupied by the flat-floored valleys of the Markham, Ramu, and Sepik rivers. In the areas of coarser gravelly detritus from the hills there are large expanses of grassland, probably the result of long-continued native burning for shifting agriculture and for hunting; but the floodplains themselves are swampy and intensely malarial, vast mosquito reserves. North again is a complex belt of highlands, flanked by the recent and active volcanoes of the offshore islands and New Britain; on the mainland itself the Mount Lamington eruption of 1951 devastated much of the Buna lowland, one of the most promising agricultural areas. But the volcanoes have contributed greatly to soil fertility, notably in the Gazelle Peninsula behind Rabaul—the area of longest effective European contact (German and Australian), of the greatest development of plantations, of the highest

and most widely diffused native literacy and economic enterprise. Rabaul itself is the most solid town of the Territory, not excluding the capital, Port Moresby.

Most of the lowlands carry a dense cover of very mixed rain-forest, tangled with lianas and epiphytes: the chief exceptions are the rather open Eucalypt and Melaleuca woodland in the relatively arid and largely calcareous patch around Port Moresby, the man-made grasslands of the Markham valley, and the probably natural grasslands of the raised coral of the Huon peninsula. The highland forests are naturally strongly zoned vertically, and include valuable timber trees such as the hoop and klinkii pines (both Araucarias), which sometimes occur in relatively pure stands favouring commercial exploitation. In the great central vale of the Highlands the forests have often been reduced to thin strips along the ridges, and elsewhere, both in highlands and lowlands, shifting agriculture has in many places produced a mosaic of secondary scrub and grass. Soil erosion is incipient, and in places has gone far beyond that.

Although nearly all of New Guinea lies within 10° of the Equator, the size of the island and its proximity to the Australian land-mass combine to give it a monsoonal regime: a south-east monsoon from May to October, when stations with a southern aspect receive most rain, while north-facing coasts are wettest in the north-west monsoon season, December to March. But most stations receive a few inches in all months, and annual totals are high: most of New Britain receives over 150 inches, and only three patches (the Sepik delta, the south of the Oriomo plateau, and the Moresby area) have under 60 inches. Stations in the Highlands are too recent for generalizations to be of much use.

The climate of New Guinea has a bad name in Australia, but this reflects war conditions, no fair test. Climatically the Highlands seem to be very favourable to Europeans, the lowlands (the more malarial swamplands apart) at least no worse than most tropical coastlands. The soils are scarcely known with any accuracy, except on a few agricultural stations, but although comparisons with Java can be discounted, not a few areas are reasonably or highly fertile. The range of agricultural possibilities is very large, if we confine our attention to physical factors of soil and climate: the economic climate, the social soil, perhaps tell another story.

Active Australian interest really began with an abortive gold-rush in 1877. A more important development took place in the 1930's, when the Wau-Bulolo goldfields were opened up. There was no access except by jungle trails, and everything needed, including large dredges, was brought in by air; this indeed pioneered the use of aircraft for economic development, an achievement in which Australians take legitimate pride. Some manganese is worked near Port Moresby, and in the past small quantities of osmidium, platinum, and copper have been exported. But in effect gold has been the only economic mineral of Australian New Guinea, and its decline is in sight. Already the gold interests are transferring part of their attention to the timber resources of the same area. The geological structure strongly suggests the presence of oil—seepages are common, and there is an active field in the Vogelkopf, at the opposite end of the island. So far, however, no serious strike has been made, though the money spent on the search has been and is a major element in the economy. But agricultural possibilities are extensive, as a mere enumeration will show. Considering only climate and soil, it may be taken as reasonably certain that New Guinea could produce all coconut products, rice, rubber, tea, coffee, cocoa, groundnuts, tung oil, sisal, kenaf, manila hemp, maize,

millets, tapioca, bananas, and a variety of temperate and tropical fruits and vegetables. Yet copra, rubber, and gold still make up some 80 per cent. of exports, copra alone accounting for half or two-thirds.

Some development problems.—We may now consider actual development in more detail, and first of all European plantation development. About 972,000 acres are alienated to non-indigenous private persons or companies; of these about 235,000 acres are planted to coconut and 27,000 to rubber. Allowing for smaller areas under cacao, coffee, and kenaf, it will be seen that less than 30 per cent. of the plantation area is in fact planted: a rather surprising fact which in itself may suggest doubts as to the wisdom of a policy of large-scale European settlement. Moreover new coconut plantings are barely adequate to replace old trees going out of production. Uncertainty as to copra prices when the U.K. buying agreement runs out in 1958, high labour costs, interest in more rapidly maturing bush crops, combine to exert a depressing influence on copra and rubber, the traditional pillars of New Guinea economy on its agricultural side. The copra industry could be rehabilitated by a vigorous programme of research and mechanization, but this calls for a fairly high capital investment, and there are more attractive openings in Australia itself, and perhaps in the newer crops. Of these cocoa, a post-war innovation, has made the best start. There are now about 20,000 acres under cocoa on European plantations, and exports already meet 10 per cent. of the Australian demand of 11–12,000 tons a year. There is no doubt at all that extensive tracts of New Guinea are as suitable for cocoa as anywhere in the West Indies or West Africa, and given the suitability of the plant for native production there seems no reason why New Guinea should not eventually produce more than Australia's requirements. Europeans also have small areas under coffee and rice. Fibres such as sisal, manila hemp, and kenaf are still in the experimental stage—a few tons of kenaf have been sent to Sydney for tests. There is some interest in tea, but its high labour demand probably rules it out on any serious scale.

However suitable the physical environment, European agriculture will always come up against the limiting factors of the availability of land and labour. These will be further discussed; but at this point it may be remarked that in secondary industry European enterprise has probably a less uncertain role to play. Although some native cooperative societies have developed minor craft industries for their own needs, it seems likely that the need for capital and for managerial and technical ability will keep any serious developments in secondary industry in European hands for a long time. There are modest possibilities, and some progress is being made. Copra processing has had a chequered history, but about 9000 tons of coconut oil are extracted yearly; capacity is thrice this amount, but expansion is held up by the provisions of the copra marketing agreement with the United Kingdom.

Two minor developments are of great interest as integrating native production with European management; these are the processing of passion-fruit at Garoka, the main centre of the Highlands, and the extraction of cutch from mangrove bark in the Kikori delta. There is a large demand for passion-fruit products in Australia, and the pulp or juice is valuable relative to bulk, so that it can stand air freights. Cutch is a valuable tan- and dye-stuff, and with proper conservation it has great possibilities in the otherwise negative coastal swamps. Both these rely on native growers and collectors, and if carefully handled should produce benefits alike to the European entrepreneur and the native producer. The indigo industry in India began in just this way, and ended in monstrous debt-slavery; but with an

Administration which is watchful on behalf of native interests, the promise seems greater than the risk.

The expansion of such crops as cocoa, groundnuts, coffee, perhaps kenaf and sisal, should lead to more openings for secondary industry. In the technologically very backward milieu of New Guinea, more grandiose schemes for harnessing the great hydro-electric potential (possibly to smelt bauxite from the Wessel Islands in the Gulf of Carpentaria) are perhaps premature. But the "multiplier" effect of a really significant oil strike might warrant the very high investment needed for major industrial development.

Indigenous production.—The most significant feature in the native economy is that the trend towards production for the market seems to be both more rapid and more firmly based in the second than in the first post-war quinquennium. It is still overwhelmingly a primitive subsistence economy; but at least one-fifth of copra output comes from native groves—about 20,000 tons, representing in 1953–54 nearly £A1,500,000 and 11 per cent. of total exports; and natives own well over 1,000,000 cocoa trees, mostly in the Gazelle Peninsula—probably nearly half the total in this area. The indigenous economy is based on shifting garden cultivation, primarily of fruits and roots. The introduction of the steel axe has not been an unmixed blessing; when stone adzes were the only tools, the larger trees were left standing and inhibited soil erosion. There has been a deterioration in this respect, and in the Highlands there are signs of a more rapid rotation in the bush-fallow system and a neglect of the indigenous anti-erosion practices of planting casuarinas and forming rude terraces of logs arranged along the contours. This may well reflect local incipient pressure on the land, as might indeed be expected, since the suppression of tribal war and the spread of medical services must have had some effect on population increase. It is not impossible that in twenty or thirty years the Highlands will become a congested and distressed area if there is not something like an agricultural revolution.

More specifically, it seems that a change from shifting to sedentary cultivation, and from roots to cereals, is needed; not to supersede the indigenous culture but to supplement it. Either to provision labour for any considerable European development, or to foster native commercial agriculture in the most favourable areas, it is essential to have food surpluses which can be stored and transported. The existing staples, roots and fruits, are perishable and extremely wasteful to transport, and so long as this is so, the great bulk of a labour force of about half a million will be locked up in the task of feeding and housing itself on a low subsistence level. The present position is paradoxical. About 11,000 tons of rice a year are imported from the Riverina to an island which contains large areas admirably fitted for wet rice; meat and vegetables are also largely imported, although again the local demand could probably be met locally.

Transport difficulties.—The successful example of the Wau goldfields, the building of airstrips during the war, has perhaps led to over-reliance on air transport. Most of the 175 airfields are adequate only for very light aircraft; very few have facilities for night landing or ground-to-air control, and most are liable to frequent interruption by bad weather in the rainy season. Flying in New Guinea is an entertaining business, with a slight tincture of sporting risk. Terrain and climate make road construction and maintenance very difficult and costly. There is a fair network for 30 or 40 miles around Rabaul; the most economically significant road is the 90 miles from Lae to Bulolo, serving the goldfields and timber area; and efforts are being made to link up various disjointed lengths of wartime jeep road

to give the Highlands an outlet to Madang. But really adequate roads are probably beyond the resources of the Administration, unless the cost could be carried to defence account, which might not be unreasonable. With all its limitations, air transport alone has made possible the development which has taken place in the Highlands in the last ten years, and it will continue to play a major role. Sixteen regular services operate, and charter traffic is very important.

Development as a social problem.—New Guinea offers much scope to Australians, but probably as sojourners rather than as settlers. Managerial, professional, and external commercial services will probably remain European preserves for a long time to come, though even here there is scope for native development. But the share in primary production which might reasonably be allotted to European enterprise is probably more limited than is generally realized, if due regard be given both to economic *mise-en-valeur* and to social welfare. Plantation agriculture has undeniably been of great service in the development of New Guinea, but its disadvantages may bulk more largely as time goes on. Although perhaps only half to two-thirds of the labour legally available for indenture (*i.e.* one-third of males between eighteen and forty-five years of age) is used, the incidence of recruiting is uneven, and locally the margin of safety is narrow, leading to complaints of neglect of the traditional male tasks of fencing the gardens and hunting. But even more important is the question of the availability of land. Whichever party has been in power at Canberra, the tradition of the paramountcy of native rights in land has been honourably upheld. Land may only be alienated after not only current native claims (often vague and extensive) have been safeguarded, but also likely future needs. The present Minister for Territories, Mr. Paul Hasluck, has put the point with realism and courage: "the pace of development is necessarily related to the pace of native progress towards civilization. The administration of lands is the chief means whereby this balance can be preserved, and it will be consciously used for that purpose, either to speed up or to slow down development to keep it in close relationship with the changes taking place among the native peoples."

For reasons suggested at the beginning of this paper, we need in fact to speed up rather than to slow down; the question is on which line, by European enterprise or by indigenous production (they are not altogether mutually exclusive), and here the availability of land is of crucial importance. There is a strong desire in Australia and among Australian "Territorians" for more white settlement, which is understandable after the experience of the war in New Guinea; but, while there is still some scope for it, the demand seems to contain more sentiment than sense.

This is particularly true of small-farming settlement. It is sometimes said that this would avoid the social evils of segregating labour in plantation compounds, by providing employment close to the villages. But those areas where there is likely to be any considerable reserve of day labour are precisely those where land is least likely to be surplus to native needs. Especially in the richer coastal pockets with their hot humid climate, European settlements would have to be fairly large if passable standards of amenity are to be secured without impossibly high overhead costs; and it is very unlikely that in any of the areas suggested there would be reasonably large and contiguous areas of good land free for alienation. Unless small-scale European settlement were to be subsidized by the Australian taxpayer to an inordinate extent, it seems likely that the main result would be the formation of a "poor white" class. Even were the probability of economic gain as clear as it is dubious, it might well be offset by the political risk—the risk of alienating

native confidence, which paid good dividends to Australia in the New Guinea campaign.

On any significant scale, then, it seems to many observers that European small-scale settlement may be ruled out, except perhaps for a few pioneers to act as pilots for indigenous enterprise; suitable men would perhaps be difficult to find. As for the combination of European and indigenous activity in the form of share-cropping, which has sometimes been suggested, experience in many parts of the world suggests very strongly that the results of such association are almost inevitably disastrous socially, and in the long run that means politically.

We may return briefly to the plantation. It has its advantages: it introduces an industrial component by way of processing, and can contribute greatly to secure uniformity of quality, a point on which peasant production is often weak. Given confidence and initiative, mechanization could go a long way to overcome the labour difficulty. As Dr. John Andrews points out, there are possibilities in a modified plantation system in which the natives, with credit assistance from the Administration, gradually took over the plantations, which initially would be managed by a European career service, which would also look after central processing and marketing. This resembles the Managing Agency system in India, which with all its faults did greatly facilitate the transition to Western forms of economic organization. But it is perhaps premature to write off direct European plantation enterprise; even if the profits largely go out of the country, it seems economically a more reasonable proposition than small-scale European farming, and possible social abuses can be far more easily guarded against. And surely some of the unplanted two-thirds of the land already alienated could be used.

There remains direct native enterprise. Here the tempo is accelerating, very unevenly it is true. The rather ambitious project for fully mechanized production of dry rice in the Mekeo tract of Papua, which to many observers seemed to demand an undue share of the scanty resources of the Agricultural Department, seems to have slackened off. It has however served to stimulate native interest in rice-growing in the north, in the Sepik and Madang Districts: here output of milled rice has already reached nearly 1000 tons in three or four years, and is expected to reach 4000 by 1960. Of these, 2500 would be surplus to local requirements—a small figure, but nearly a quarter of the New Guinea demand for plantation and government labour.

The Gazelle Peninsula remains the forcing-house for indigenous enterprise, both collective and individualistic: it has the bulk of the native output of copra and cocoa. This it owes both to its natural advantages, chief of which is its fine volcanic soil, and to the length and intensity of European contact, which has given it *inter alia* an unusually good road net and an unusually high level of literacy and sophistication. The chief stronghold of German plantation and missionary activity is now the most active growing-point of native enterprise.

One experiment, admittedly outstanding in initiative and forethought, must represent several.[1] Well inland from the great volcanic caldera within which lies Rabaul, the Rabaul Native Village Council has taken out a ninety-nine-year lease of 1000 acres of Administration land. To quote Dr. Andrews, "the expressed aims of the Council were to provide a refuge for its people in case of volcanic eruption near Rabaul, to augment the group's food supply in view of increasing population, and to plant cocoa for cash returns." The Council is building roads by voluntary

[1] For these details, grateful acknowledgement must be made to Dr. John Andrews, Department of Geography, University of Sydney.

labour, and providing materials and truck transport for housing. Half the block is reserved for food-gardens, the rest is to be let out on twenty-year sub-leases for cocoa, with a time limit of three years for planting; over half of these are already taken up. The next two years will see whether the initial drive has been sustained; but irrespective of success or failure, the initiative is surely symptomatic of a new spirit among people only three or four generations away from a virtually Neolithic economy—a spirit most active in the Gazelle, but not confined to that area.

In all this the active guidance of the Territory Administration has been of vital importance. There have of course been difficulties and mistakes: in the Rabaul area itself the institution of Native Village Councils, the essential first training in local self-government has met with frictions stemming from old tribal and/or mission antipathies. It would be misleading also to suggest that the new spirit, though very widely diffused to some degree, has as yet had a really powerful impact on more than a fraction of the people, most of whom still live in their old way, with a few modern conveniences such as steel axes, kerosene lamps, pots and pans. And for most of them tribal and clan loyalties are still the dominants of life.

Then there are purely administrative problems: the anomaly by which the very different problems of New Guinea and the Northern Territory divide the attention of the same officials at Canberra, the relations between Canberra and the man on the spot, the problem of priorities. The administrative butter seems spread very thin, and it may be that the efforts of some departments, in themselves praiseworthy, have been too widely diffused. Given the slender resources in men and money, this is not surprising. There has also been a lack of clear and continuous thinking in Australia at large on a subject which does not vitally interest many Australians except those who have axes, political or financial, to grind.

The way of advance by fostering indigenous enterprise may be as slow and difficult as that by European settlement; but it would almost certainly be less costly financially, socially, and politically. It will in course of time lead to nationalist demands, doubtless immature and premature. But to treat New Guinea as a colony of settlement will not avoid these: it may even precipitate them, in a context of revolution rather than of evolution. In the thirties, when the pioneer patrols pushed through the jungly mountains to the exhilarating open grasslands of the Highlands, no phrase was commoner than "a second Kenya." Understandably, these words have not been much heard lately; they should perhaps be remembered.

One last thing must be said to the honour of Australian administration in New Guinea: there has been no trace of "Divide and Rule." Rather there has been the reverse: an effort, particularly in education, to create from a congeries of tribes and clans a sense of unity where none existed before. Shortcomings there have been and still are, but surely outweighed by this fact alone.

Acknowledgements.—Thanks are due to officials of the Department of Territories, Canberra, and of the Territory Administration, for facilities and hospitality; to colleagues of the Australian National University and friends in the South Pacific Commission and the Australian School of Pacific Administration for discussion, published and private; and perhaps especially to Dr. John Andrews of the University of Sydney. None of them, however, should be held responsible for any statements of fact or opinion.

Unless the context implies the whole island, "New Guinea" means the Australian half (Papua and the Trust Territory) only. The paper was originally given as a lecture to the Society, and the argument has had to be shortened for publication.

DISCUSSION

Evening Meeting, 19 March 1956

Before the paper the PRESIDENT (General Sir JAMES MARSHALL-CORNWALL) said: This evening we are to hear about problems confronting the Australian Government in administering their Trusteeship Territory in eastern New Guinea. New Guinea is a long, narrow, mountainous, tropical island lying just south of the Equator and north of Australia. Some of the native tribes in the interior are very primitive indeed and their way of life reflects the culture of the Stone Age. New Guinea is divided into two almost equal parts by the 141st meridian of east longitude. On the west of that boundary is Netherlands New Guinea; the east is under British sovereignty. Prior to 1914 the northern part of that eastern half of the island was a German colony, known as Kaiser Wilhelm Land. The Germans renounced their sovereignty there by the Versailles Treaty in 1921 when the whole of the eastern part of New Guinea passed under Australian administration. The Commonwealth Government placed the Territory under the Trusteeship system established under the United Nations Charter, and the agreement under which Australia became the sole administering authority was approved by the General Assembly of the United Nations in 1946.

The Royal Geographical Society has always been keenly interested in the exploration and mapping of New Guinea. In 1896 our Founder's Medal was awarded to Sir William Macgregor for his pioneer work in that sphere. Since then in the *Geographical Journal* we have published accounts by explorers and travellers who have been into the interior of that little-known country—Champion, Chinnery, Leahy, Spinks and others. In this hall we have listened to lectures on the country from A. J. Marshall and Miss Cheesman. This evening our lecturer, Professor Oskar Spate, who holds the Chair of Geography in the National University at Canberra, will discuss the problems and difficulties in the way of applying white settlement to this tropical island. I heard recently that Canberra University is unique in having no undergraduates, so that Professor Spate has more time to devote to other interests. He has obviously spent that time to very good advantage, for he has travelled extensively in India and South-east Asia.

Professor Spate then read his paper

The PRESIDENT: We are very much honoured tonight by having as our guest His Excellency the High Commissioner for Australia, Sir Thomas White. He is not only High Commissioner in London for Australia but is also a Fellow of the Royal Geographical Society, and has been so for the last twelve years and more. Unfortunately, Sir Thomas White is relinquishing his appointment as High Commissioner within the next few months and we in this Society are extremely sorry to see him go. I now ask Sir Thomas to give us his point of view on the extremely lucid and incisive lecture to which we have listened on New Guinea.

Sir THOMAS WHITE (Australian High Commissioner): We have listened to an interesting lecture by Professor Spate about a fascinating country, the only country which is not completely explored, so that whatever it may lack in economics it makes up for in appeal, especially to young men. If I had a son I would be only too glad to have him settle in New Guinea. Australia and New Guinea are two entirely different countries. In Australia we have aborigines who are not agriculturists; they are hunters. In New Guinea it is the reverse; many of the people are agriculturists, although in parts some are head hunters. But one cannot generalize about them; in some places they are dwarfs, in others they are giants. In Australia settlers in the Northern Territory would be isolated if it were not for aviation; and in New Guinea there are not many roads because aviation is a better means of transport. People living in out-back parts of Australia can get a doctor more quickly than those living in Sydney or in London, with the Flying Doctor. That applies in some parts of New Guinea also.

We went into New Guinea in the 1880's, but were advised by the Colonial Office to leave it again. We did so, but later came into Papua, or southern New Guinea, after the Germans had gone into the north. In the south the Papuans speak Motuan, a sensible language, whereas in the north the means of communication is by Pidgin, a trader language of about 400 words. As the vocabulary is very limited, certain words that are very seldom used are arrived at by circumlocution, *e.g.* "piano" is "big-feller-boxus-you-fightem-teef-he-sing-out." An eclipse is "kerosene-belong-Jesus-Christ-finish."

Although there are other battle-grounds, as Sir William Slim, our great Governor-General, has recorded more than once, the first defeat the Japanese suffered during the last war was in New Guinea at Milne Bay, and that started a series of victories. I happened to be the Acting Minister for External Territories for a while. The 1930's were the days when the gold diggers—retired naval officers, and men of all types—came to the gold mines, and one saw them playing poker for gold dust. Those men and their descendants own the coconut plantations in these days. When there, I was greatly impressed by the calibre of those men and felt it would be a pity if they ever left the country. I was successful in passing through Parliament bounties for ten years on the growing of many of their tropical products, which I hoped would cover the period of any possible war. During the last war many of these men were coast-watchers. New Guinea was very heavily ravaged; some of the men were caught and executed. Incidentally, we lost more men in the battles of Gona and Sanananda on the north coast of New Guinea than our 9th Division lost in the battle of El Alamein, in which they took a leading part.

We have not only to look at New Guinea from the economic point of view, from the point of view of what we are doing for its indigenous inhabitants and the countries of South-east Asia. New Guinea is an outpost, and those men we kept there, reinforced by our armed forces, took the first shock of invasion. After the war had been won in Europe, it continued in New Guinea and Borneo, and took heavy toll of our troops. I think the New Guinea natives remained loyal to us because we considered their welfare. I remember a conversation at that time with Sir Hubert Murray, the administrator of southern New Guinea and brother of that great Australian, Professor Gilbert Murray. I remarked to Sir Hubert that the natives were being treated pretty well, but it would be useful if there could be a road or two constructed for the sake of those who had to ride horses to get anywhere. He emphasized that consideration for the welfare of the natives and their future came first. I suggest you read his book. The natives are now growing cacao, fruit, tropical crops, and particularly coffee, which is cheaper than that grown in parts of the world I will not mention.

We had the tremendous task of rehabilitating the country and rebuilding the towns flattened out by the Japanese. That rehabilitation is continuing. It started under the mandate of the Allies after the First World War, under which the Australian Government established its administration in the north in 1921. After the Second World War the administration was handed over by the Government of the day to the International Trusteeship Council and from time to time the United Nations discussed these countries. There is a certain country represented on the Trusteeship Council, to whom the word "colonialism" is anathema; but they have never been able to put their finger on any abuse on the part of the administration. The New Guinea natives have representation in the Territory's Parliament, at least three seats being reserved for them on the Legislative Council. As Professor Spate has told us, the natives have their Councils. By and large, the development is proceeding well. Every now and again—perhaps I should not say in what country—a man may discover a new paradise, a Shangri-La, in New Guinea, where it is claimed nobody has ever been before. Generally in these territories the Australian political or patrol officer has been established long before; the penetration is slow and gradual, but it is taking place all the time. I would like to see, though, an interchange between them and other colonial

territories. If you ever met a Papuan or a native of the northern part of New Guinea, you would realize you were meeting a happy man. There is no poverty; the natives are well fed and looked after. One of the greatest services we have rendered them is on the medical side; there is an entirely better standard of health than when the natives settled. I could say a great deal more following Professor Spate's delightful talk on New Guinea, but I will conclude by saying that we in Australia have New Guinea very much at heart, as I am sure people in England have also.

The PRESIDENT: We have heard something about head hunters and anthropology; we have seen pictures of the native architecture. We have with us Professor Raymond Firth, who holds the Chair of Anthropology at the London School of Economics.

Professor RAYMOND FIRTH: I, too, have been extremely interested by the illuminating address given us by Professor Spate, and I have been moved by the words of the High Commissioner about New Guinea. My competence in this field is slight. My knowledge of the country is brief. Perhaps the only reason for my being here is that I did accompany Professor Spate on his first visit to New Guinea and together we flew over various parts of the countryside. My memories of those expeditions are exceedingly keen. I learned a great deal through the practised eye of a geographer about landscape and its potentialities. I knew, roughly speaking, what such tropical landscape meant in the way of exploitation and development, but it was only when the geographer pointed out exactly where were the incipient signs of erosion that one appreciated what lay behind the superficial appearance. Then there was my recognition of Professor Spate's fortitude. On one occasion we were on the island of Watom, near Rabaul. He went out, as a good geographer, to investigate a coral reef and a sea animal stung him across the foot. He bore the intense pain as it developed with great fortitude and carried on his geographical work for the next week or ten days.

Professor Spate spoke of New Guinea as a difficult country and he used the word "difficult" at least three times in the course of the lecture. I believe that is the impression made on most scientific people going there. It is extraordinarily rugged. Flying up the narrow valleys in a Norseman 'plane you wish your insurance policy were at least five times its amount. Nevertheless, somehow, owing to the magnificent skill of the pilot, you arrive at an air strip. Conditions of travel are hard once you get away from the coastal areas. The interior is economically difficult from the point of view of transport and also marketing; so much has to be flown out and flown in, so that costs are high. It is difficult because of what the lecturer described as the interminable fragmentation. You find a few hundred people speaking one language and next door a few hundred speaking another language. The difficulties of political representations of such people in any democratic sense are obvious. That is part of the impression one gained of the great task ahead of the Australian Administration in trying to develop New Guinea for the benefit of the local white settlers and the native people themselves.

On the question of the settler controversy, it is difficult to express briefly the opinions one may hold. The issue is debatable, as you have no doubt gathered from the lecturer—in what I regard as a very balanced view of the whole situation. But on the issue of native development there can be no question. There you have a large number of people; this country is their home, and they are essentially a growing people; the interests of their life are expanding all the time. On the one hand, there are Stone Age groups who are extremely primitive; on the other hand, there are people in the Gazelle Peninsula and elsewhere whose annual income runs into three and sometimes four figures and who are already capable of appreciating the great variety of things that modern civilization can offer them. They will not stand still. What forms of development will be most suitable for them all, time alone will tell. This, I think, is where the need for research by geographers, anthropologists and other social scientists comes in. We went to New Guinea as a group of scientists to look at some of the possibilities of research. I have already said how impressed I was by the geographer's contribution. This is not the place to enlarge upon the anthro-

pologist's contribution. But there is an enormous need for the study of culture, the social life and institutions of the peoples of New Guinea. There is still a great need for more anthropological research. In such work both the Australian National University and the University of Sydney have begun to play an important part. There is an equal need for geographical research. It happened that some years ago I had occasion to study the geographical materials of New Guinea and I was then impressed by the lack of data. That lack of knowledge has been rectified to some extent by recent work by Professor Spate and his colleagues from Australia; but there is a great deal of research to be done still if the capacities of this extremely interesting and fascinating country are to be realized to the full.

The PRESIDENT: We should like to hear Professor Dudley Stamp, Professor of Social Geography, London University, conclude the discussion.

Professor DUDLEY STAMP: I have no claim to speak tonight because my sole knowledge of New Guinea is its horizon in the distance when I was travelling through Indonesia to Thursday Island. I take it I have been asked to speak because I happen to have known the lecturer for, roughly, a quarter of a century. Professor Spate is a brilliant Londoner who forsook London for part of his education in Cambridge, later he became a lecturer in the University of Rangoon. We enticed him back to London, but he obviously suffered terribly from claustrophobia in a house in Hampstead, or in the lift getting to the fifth floor of the London School of Economics. And so he sought the open spaces of Australia. But he seems still to have found the 3,000,000 square miles of Australia not enough and so he has extended his interests to New Guinea.

I am sure you agree with me that we have had tonight an indication of the great new field which is steadily opening up for this Society. Reference has been made by the High Commissioner to the fact that New Guinea is perhaps the one remaining unexplored territory of any size in the world. Well, the exploration of today is a natural development of what has been done in the past. As Professor Firth has suggested, the need is for coordinated work by groups of scientists, and that is what has been initiated in New Guinea. I am sure, in view of the problem which has been put before us tonight, we must all realize what a need there is for unbiased and, if I may say so, unpolitical investigation. Indonesia is a region of contrasts. It is only necessary to think of the thickly populated island of Java not so far away from this sparsely populated undeveloped area of New Guinea, with a universal pressure of population on land resources, to realize that it is a great thing to have the mind of a first-class scientist—and I am obviously referring to our lecturer—turned towards some of the problems of development of the so-called undeveloped countries of the world. I feel sure you have appreciated as much as I have this account of Professor Spate's own work in New Guinea, and will record your thanks to him in the usual way.

Professor SPATE: I do not think that there is much that I can usefully say in reply to the discussion, except to express my thanks to the President, Sir Thomas White, and my friends Professors Firth and Stamp for their very kind reception of what is, I fear, a far from adequate discussion of a problem much more complicated than it looks. It will be obvious that I am not altogether at one with Sir Thomas in my assessment. We do need some carefully thought-out European settlement in New Guinea, but I am convinced that an all-out policy of forcing the pace of settlement would be a new Kenya—and moreover the natives would not be the only losers. In the interest of historical accuracy, I am afraid I must point out that Professor Firth may have misled you. I had no ulterior geographical motives on that reef, I was simply out for a swim. And what he did not mention was the tender care with which he transported me back to Rabaul!

GEOGRAPHY IN POLAND SINCE THE WAR

JERZY KOSTROWICKI

THE ORIGINS OF Polish geography are to be found in the Renaissance, when a lively intellectual movement developed round the University of Cracow. A number of descriptive works and travel diaries were written, notably the 'Chorographia regni Poloniae' by Jan Długosz (1415–80) and the 'De duabus Sarmatiis' by Maciej z Miechowa,[1] a description of eastern Europe published in 1517 and for long considered the best source of information on this part of Europe. The first maps were also compiled about the same time; in 1526 the first large-scale map of Poland (about 1 : 1,260,000) was published by Bernard Wapowski. A large number of contributions by sixteenth and seventeenth century Polish geographers and cartographers could be mentioned here.[2]

In the second half of the seventeenth and first half of the eighteenth centuries Polish science as a whole declined, and it was only in the second half of the eighteenth century (the Age of Enlightenment) that scientific interests revived. As elsewhere, a number of enlightened minds laid the foundations of modern science, including geography, and between the end of the eighteenth and beginning of the nineteenth centuries the names of Stanisław Staszic, Hugo Kołłataj, Jan Śniadecki, Joachim Lelewel and others may be mentioned. The beginnings of economic geography are to be found in the work of Tadeusz Czacki, Fryderyk Skarbek and others.[3] Among the maps compiled at this time, those by Tadeusz Czacki and K. Perthées are to be distinguished. In the 'thirties of the nineteenth century the first detailed topographical map (1 : 126,000) of the Kingdom of Poland was produced by the Quartermaster-General's office of the Polish Army.

Throughout the nineteenth century, Polish geography continued to develop despite the obstacles to scientific progress caused by the division of Poland between the partitioning powers. Patriotism played its part here, promoting a tendency towards the study of the territories which had formed pre-partition Poland. In 1849 the first university chair of geography in Poland was created in the Jagiellon university of Cracow. For the most part, however, Polish scientists worked abroad: among the best known were the explorers of South America (*e.g.* I. Domeyko, J. Warszewicz, K. Jelski, J. Sztolcman, J. Siemiradzki), of Australia and Oceania (P. Strzelecki and J. Kubary), of Asia (J. Potocki, J. Czerski, B. Dybowski, B. Grąbczewski), of Africa (S. Rogozinski) and of the Antarctic regions (H. Arctowski and A. B. Dobrowolski). At the end of the nineteenth and beginning of the twentieth centuries, the progressive scientist Wacław Nałkowski was active in Warsaw, and his contribution to Polish geography is only now being fully appreciated. In the last decade of the nineteenth century, the great Polish climatologist, cartographer and geomorphologist Eugeniusz Romer began work at the University of Lwów—work which was to continue for many years.

The recovery of independence by Poland in 1918 increased opportunities for the development of geography. Chairs were created in the six Polish universities and centres of scientific research were founded. Yet geographical research during this period was haphazard and in spite of the contributions of such outstanding geographers as Romer, Sawicki, Pawłowski, Smoleński, Lencewicz, Limanowski and Nowakowski little progress was made: in particular, economic geography lagged

behind. Polish geography was influenced by the West, particularly by Germany, and there was an almost complete absence of any national trends. Organization was as haphazard as research, and as many as four geographical societies were active at the same time, six geographical periodicals were published as well as thirteen serial publications, all appearing irregularly, owing to lack of finance and of material.[4] The Second World War wrought havoc among Polish geographers. Sixty-eight workers in the field of geography, including seven university professors, died in Nazi concentration camps, in action, or as the result of conditions during the Occupation.[5] The geographical institutes were wrecked, their instruments destroyed and their libraries burned or dispersed.

In the first period after the liberation of Polish territories, the geographers who survived decided that their most urgent field of work lay in the "Recovered Territories" of the West, and they concentrated on the reconstruction of these areas,[6] taking part in the work of the Scientific Council of the Recovered Territories and of the Western, Baltic and Silesian Institutes. A number of studies and monographs were prepared, based in the first instance on German material, and then on original research.[7] Several geographers also took part in the delineation of Poland's new frontiers. Reconstruction of the universities proceeded gradually. New centres of research and teaching were created: chairs of geography were founded in seven universities, as well as higher economic and teachers' training Colleges. In 1946, all Polish geographers united in a single Polish geographical society, which was to play an important part in the geographical life of Poland for the next seven years. The central committee of the Polish Geographical Society strove, through its scientific department, for the coordination of scientific research. The section for school geography cooperated with the Ministry of Education on school syllabuses and the organization of geographical teaching. In 1948, membership of the Society was over 2000, and eleven branches were formed. Four field research stations were started, and many conferences, courses, excursions (and five annual congresses) were held.

The beginnings of planned economy in Poland in the form of the Central Planning Office and the Head Office of Regional Planning also attracted geographers: these offices and their local branches employed about thirty geographers.[8] Geographers employed in schools also undertook a number of studies and contributed largely to planning programmes.[9] An important piece of geographical work was the defining of the spheres of influence of the eighteen largest cities in Poland, on which was based the post-war reform of the country's administrative divisions. In the main, however, scientific research in the first post-war years pursued the questions which had concerned the inter-war period, and a number of studies completed, or at least begun, before the war were now published. A lack of coordination in subject matter, and a diversity of methods, continued to obtain until a certain rationalization was attained in 1949. At the congress of the Polish Geographical Society that year, proposals were put forward for basing geography on the philosophical foundations of dialectical and historical materialism, for establishing a closer connection between geography and the needs of life, and for concentrating on the most important problems, both theoretical and practical.[10] In 1949, planning was also reorganized. The State Commission of Economic Planning became the only institution of economic planning, and regional planning was subordinated to this. At the same time, the reconstruction of scientific work in universities and the introduction of new syllabuses drew geographers from the planning offices to the academic world.

The preparations for the first Congress of Polish Science, which continued for eighteen months, were of great importance in the development of geography, and a research programme for Polish geography was drawn up and submitted to the Congress in 1951.[11] Attention now became focussed on the most important problems, and work was financed through the scientific department of the Polish Geographical Society. The part played and the functions exercised by the Polish Geographical Society increased, and it was able to draw upon increasing resources. Its library grew, its publishing activities multiplied, and the exchange of publications with the rest of the world widened. An important centre of geography and geography training is emerging in Warsaw, based on the central committee of the Polish Geographical Society and the Geographical Institute of the University of Warsaw. This centre is presided over by the chairman of the central committee of the Polish Geographical Society and the director of the Geographical Institute of the University of Warsaw, Professor S. Leszczycki. The organization of geographical conferences began in 1951. More than ten have been held, with important results, and were attended, as well as by geographers, by the representatives of allied disciplines: geologists, meteorologists, geodesists, historians, and so on. The results of the conferences have been published in the *Polish Geographical Review* (*Przeglad geograficzny*).

Cooperation between geography and planning has again increased. Specialized courses in the economic geography of Poland are being organized in Warsaw, to train geographers for planning. Numerous studies of geographical environment, population and settlement of the relevant areas are being carried out by university departments to meet the needs of regional planning. Some studies are also being undertaken with a view to economic planning. In contrast with the earlier period, only such topics are dealt with as will guarantee the methodical progress of geography as well as having a practical purpose. These are often problems which are already included in university research plans, and only the area covered and the dates of research are mutually agreed upon and adapted to the needs of planning.[12]

In the autumn of 1953, the Geographical Institute of the Polish Academy of Sciences (P.A.N.) was created. This institute took over the library, part of the property, the research stations and the activities of the science department of the Polish Geographical Society. Since then, the Polish Geographical Society has been concerned primarily with popularization, and the teaching of geography in schools. Professor Leszczycki, chairman of the Polish Geographical Society for many years (to whom Polish geography owes a great debt), took over the duties of director of the Geographical Institute while Professor Raymond Galon was elected chairman of the Society. The Geographical Institute of the Academy of Sciences conducts scientific research through its departments, laboratories and research stations, and at the same time coordinates scientific work in geography throughout Poland. Every year directives are worked out, covering the most important research problems and approved by the geographical committee of the Polish Academy of Sciences, on the basis of which the departments of geography in universities and colleges and the Geographical Institute of the Polish Academy of Sciences make their plans. The plan of work of the Institute is discussed and approved at sessions of the scientific council of the Institute, which is composed of the most outstanding representatives of geography in Poland as well as of representatives of offices and institutions concerned. A report session of the Geographical Institute also takes place yearly, at which the results of research for the preceding period are announced and discussed.

In 1956, a five-year research programme for Polish geography was drawn up: it

deals with those problems which are considered of most importance from the point of view of geography as a science, and of the needs of the economic life of the country.[13] This plan is, of course, subject to alteration and merely outlines the trend of development for, with the emergence of new practical needs and the progress of science as a whole, new subjects and problems find their way into the annual plans. The aim is to concentrate the maximum of means and effort on some few selected problems, while leaving a margin for individual studies and interests.

At the end of 1955, the Geographical Institute of the Academy of Sciences employed one hundred persons. The Institute consists of three departments: of physical geography, economic geography and cartography, which are in turn divided into laboratories (*e.g.* the climatological laboratory, the laboratory of agricultural geography, of settlement geography, etc.). There is also a documentation section and library and map collection. The Institute also has three local stations, in the Tatras, in the Sudetic Mountains and in the Mazurian lake district. The Geographical Institute also issues its own publications.[14] Moreover, there are now twenty-three chairs of geography in seven Polish universities (compared to six chairs before the war), which in turn employ forty-four independent and eighty assistant research workers. Seventeen independent and about thirty assistant research workers are employed in economic and teachers' training schools.

Some 200 young geographers graduate annually from Polish universities, specializing in one of the following subjects: cartography, physical geography, geomorphology, climatology, the economic geography of Poland and the economic geography of the world. The majority of these students obtained scholarships and free accommodation in student hostels. After graduation, they find employment in schools (about 60 per cent.), in planning offices, drawing offices, the meteorological and hydrological services, cartographic offices and research institutes. Two further special subjects (hydrography and soil geography) are to be added to the above. As well as assistant research workers, some twenty graduates read for the "candidate of science" degree in geography, and receive full state scholarships for three years.

Physical geography.—In Poland, physical geography is characterized by its uneven development. The best developed branch is geomorphology, with hydrography and climatology a little way behind, and soil geography and bio-geography lagging considerably.[15] This is a result of the earlier periods when Polish geographers devoted most of their attention to geomorphology. Their followers, who now fill the chairs of physical geography, have also become specialists primarily in geomorphology. There are also a certain number of climatologists and hydrographers. In the field of soil geography and bio-geography, we lack even the specialists necessary for training of new workers, and proposals have been made to send abroad for study those wishing to specialize in these branches. In geomorphology, the inter-war years produced a number of contributions by S. Lencewicz, S. Pawłowski, L. Sawicki, J. Smoleński and their followers. In the post-war period, some fairly comprehensive geomorphological monographs have been published.[16] Most of the works published, however, were characterized, just as in the inter-war period, by lack of coordination: they were mainly devoted to descriptions of individual forms, with no attempt to connect them with the geomorphological evolution of the area in which they occur, or with other elements of the natural environment as a whole.

Rationalization in this field was only brought about by the detailed geomorphological survey of Poland.[17] Plans for a 1 : 25,000 geomorphological map were outlined in 1946. From 1950 on, work on the project was undertaken by all the university centres of Poland. Up to and including 1955, about 50,000 square

kilometres of the area were mapped. At first attention was mainly directed to the methods of geomorphological mapping: later, stress was laid upon reconstruction of the geomorphological evolution of the area mapped, in connection with changes in other elements of the natural environment. Mapping gave rise to numerous problems which are at present the subject of a number of studies.[18] Attention has also been paid to contemporary geomorphological processes. Indeed, the geomorphological map has been found of use for economic purposes [19] and in regional planning. The work as a whole is now directed by the department of physical geography of the Geographical Institute of the Polish Academy of Sciences. A further 50,000 square kilometres are to be mapped by 1960. Considerable results have also been achieved in research on periglacial relief, particularly at Łódź University.[20] A number of publications have been issued, and from 1954 the *Periglacial bulletin* (*Biuletyn peryglacjalny*) has appeared in Łódź. The Łódź and Wrocław centres are also conducting research into denudation of slope while the Warsaw and Toruń centres work on glacial relief.[21]

The limnological research begun during the inter-war period was at first continued.[22] The inventory of 9296 Polish lakes with a surface of over 1 hectare is of great value, and an attempt at a synthesis of Poland's lakes has been made on the basis of this list.[23] Achievements in other branches of hydrography have been disappointing: this is partly the result of a lack of separate chairs of hydrography, and the consequent lack of geographers who specialize in hydrography, and partly of the relationship, not clearly defined, between hydrography as a geographical and a natural science, and hydrology considered in the main, as a subject of work for technicians. Among the more comprehensive contributions to the early post-war years was a collective monograph on the Oder River.[24]

A change was brought about by the undertaking in 1952 of work on a detailed hydrographic map of Poland, carried out by all centres of geography in Poland in the same way as the geomorphological map. By 1955, an area of some 40,000 square kilometres had been mapped. The mapping of a further 50,000 square kilometres is to be completed between 1955 and 1960. This map has not, so far, given rise to as many research problems as the geomorphological map, but it is of even greater practical use. Work on the hydrographic map of Poland is also directed by the department of physical geography in the Geographical Institute of the Academy of Sciences.[25] The most neglected branch of hydrography in Poland is oceanography. Only the Centre of Biological Oceanography in Gdynia is really well developed, while little attention has, so far, been paid to physical oceanography.

Polish climatology has the advantage of the rich heritage of Professor Eugeniusz Romer's work. He was already at an advanced age when, after the war, he put forward his third synthesis of Poland's climate.[26] In addition, a number of monographs dealing with the regional climates of Poland have been compiled, as well as fairly numerous contributions dealing with various elements of the climate. These were carried out by various methods, most following traditional climatology.[27] Dynamic climatology is still in its beginnings.[28] The Geographical Institute of the Academy of Sciences has laid the main stress in its research on local climate. Research is being undertaken upon the local climate of agricultural, industrial and health-resort areas.

Soil geography in Poland is poorly developed. A few contributions have appeared on this subject only in Lublin, while a certain amount of work has been done by pedologists,[29] who have also undertaken research on soil erosion and its prevention.[30] Nor is bio-geography adequately developed in Poland. The first results in this field were obtained, within the Geographical Institute of the Academy of

Sciences, by S. Jarosz, who has compiled a bio-geographical map of the Gorce mountain chain in the Carpathians. Botanists, particularly those of the school of the noted Polish botanist, W. Szafer,[31] have developed some branches of plant geography in Poland on the basis of "phyto-sociological" research, since Professor Szafer was always much interested in geography in addition to his own subject. Work in complex physical geography is also at a rudimentary stage in Poland. Attempts to compile a complex map of natural environments are being made, with the help of Soviet (Kalesnik, Isachenko, Prokayev and others) and German methods. A map of this kind can also serve as the basis for research in economic geography. Attempts at a new division of Poland into physical regions [32] have also been made.

Research on urban natural environment has also developed in Poland as a branch of physical geography, connected with the needs of practical life, and from the point of view of town planning. These investigations are conducted by a separate state undertaking, the "Geoprojekt," which employs many geographers.[33]

Economic geography.—The development of economic geography after the Second World War has been somewhat less vigorous than that of physical geography, as a result of the poor development of economic geography in the inter-war period and of the consequent lack of scientific workers after the war. Development was also hampered by the greater methodological difficulties in economic geography, as a social science, in the process of change-over to new philosophical bases. Because of the greater accessibility of statistical data, and its closer association with practice, the centre of gravity of research in economic geography moved—at least for a period—to the planning offices.[34] The situation improved somewhat after 1952, particularly after the creation of the Geographical Institute of the Academy of Sciences, when the essential questions of scientific research were established. But further development in economic geography was not clearly outlined until the methodological conference of economic geographers held at Osieczna in the autumn of 1955, which continued for several days and which, after a very lively and sometimes even stormy discussion, outlined the trend which economic geography was to take. Realization of the programme outlined at Osieczna will require several years, but economic geography has already revived somewhat.

Work has been in progress since 1947 on a land utilization map, on the scale of 1 : 300,000 (based on topographic maps, scale 1 : 100,000). This map differentiates arable land, pastureland, forests, water and settlements. The work is almost finished, and by the second half of 1956 the whole of Poland will have been covered. This map is, to some extent, modelled on the British map prepared under the direction of Professor L. Dudley Stamp.

The Geographical Institute of the Academy of Sciences started in 1953 some first tentative work on a detailed land use map, based on field work and on a scale of 1 : 25000. In 1955, about 1000 square kilometres of the Olsztyn *voyevodship* (province) was mapped, and in 1956 this work was extended to other areas. This map is provided with a comprehensive legend, and considers such elements as property relationships, type of crop rotation-cycle on arable land; permanent types of land use (*e.g.* forests, pastureland) are classified according to natural and economic types. Various types of settlement, industrial and mining areas, transport and waste land are also indicated. Agricultural productivity, state of stock breeding, etc., are also shown. On the basis of this map, analytical studies will be undertaken, to examine land utilization in the areas under investigation, and to determine the direction in which we should proceed in order to make full use of the geographical environment.

Between the wars monographs appeared dealing with towns (Simche), adminis-

trative districts (*powiats*) (Leszczycki) and larger areas (Nowakowski, Ormicki, Barcinski). Regional economic geography and the geography of settlements were the branches of economic geography best developed in Poland. Since the Second World War, these branches of economic geography have also brought some of the best results. The centre of gravity of research, however, has shifted from physiognomic problems, which under the influence of the German "landscape" school were dominant before the war, to questions of the functions of towns and of the relations between town and hinterland.[35] Geography of rural settlements, well developed before the war, has been neglected. Up to 1953, several university centres in Poland produced monographs on smaller towns and *powiats*. This work, however, was carried on in a haphazard way, and the results are difficult to compare, or to utilize for purposes of any wider synthesis. An important part was played here by the 1953 Poznan conference, at which the purpose and methods of such monographs were settled by discussion. Greatest stress was laid upon research on small towns, with a view to finding ways to increase their economic significance.[36] Work of this kind was undertaken by nearly all the centres, in particular by Toruń, Warsaw and Łódź.[37]

The experience of the Warsaw centre has shown that it is impossible to define the bases of development of a town without subjecting its hinterland to a detailed analysis. At about this time, a reform of the administrative divisions of Poland was carried out, aimed at increasing the number and decreasing the area of administrative units. Thus the new *powiats* mostly correspond to the economic hinterland of the *powiat* town and attention has been transferred to working out the basis of the development of the *powiat*. It was also realized that the best results could be obtained when studies were concentrated on one area. Since the territory of the Białystok province is one of the most backward economically in Poland, work was concentrated here. By 1956, all the *powiats* of Białystok will have their geographic-economic monographs. A number of subjects have also been marked out for study in close cooperation with the planning authorities with a view to improving this county economically. These studies will provide a basis for a projected economic and geographic monograph on the province as a whole. In 1955, a special team was created within the Geographical Institute of the Academy of Sciences, for the purpose of research into the Białystok province.

Research on the development and distribution of production in Poland is also included in the scientific plans of the Geographical Institute. Studies on this subject, dealing both with the Capitalist period and the last ten years, have been carried out fragmentarily and in a haphazard way by various geographical centres, but no progress was achieved in this field up to 1955. Results have been obtained only by geographers associated with the planning authorities.[38] A group of geographers still survives in Poland who do not recognize the existence of economic geography, other than regional. This view was predominant for several years, resulting in the limitation of lectures in economic geography almost exclusively to its regional aspect.[39] In 1954, lectures and classes in the geography of agriculture, industry, transport, population and settlements were introduced into university syllabuses: at the Osieczna conference, the programmes of these lectures were discussed and it was decided to develop studies in these hitherto neglected branches of economic geography. In 1956, laboratories for the geography of agriculture, of industry and of settlement were created within the framework of the Geographical Institute of the Academy.

An important problem, both for the theory of geography and for practical needs is that of the division of Poland into economic regions. This problem was pre-

viously dealt with by geographers in the Central Office for Physical Planning and later of the State Commission for Economic Planning. The work undertaken in this field by the Geographical Institute of the Academy has lately been transferred to the recently created Department of Long-term Planning of the State Commission for Economic Planning.

In addition to these trends in research, there still remain certain tasks concerning both physical and economic geographers, *e.g.* research in the fields of the history and methodology of geography, at present carried out by two organizations of the Geographical Institute of the Academy (in Wrocław for the period to the mid-nineteenth century, and in Warsaw from mid-nineteenth century). The task here is to carry out a critical analysis of the achievements of Polish geography, and to underline the progressive traditions inherent in these achievements. So far, particular attention has been paid to Polish geography of the Renaissance and Age of Enlightenment (the second half of the eighteenth century), and to achievements in the inter-war period.

Another task which concerns both physical and economic geographers is the preparation of a compendium of the geography of Poland and of a national atlas. Large-scale syntheses of the geography of Poland have been produced in the past,[40] but these earlier works are now out of date and work on a new collective geography of Poland was started in 1953. It is planned to finish the preparatory work by 1957.

The Atlas of Poland has its own traditions, for one of the first national atlases in the world was Professor Romer's 'Geographical statistical atlas of Poland' published in 1916. Other works of the cartographic school of Professor Romer are well known. After the war, work in cartography was concentrated in the Warsaw and Wrocław universities, and a number of maps and atlases have been published.[41] Work on an 'Atlas of Poland' started in 1948. So far, three sections, containing eighteen maps, have appeared, while a fourth section is in preparation. These contain only physical maps. The long-term nature of the work as well as frequent changes in the editorial board of the Atlas, have caused some alterations in its conception and plan, so that this first edition should be regarded as provisional. From the first, the Geographical Institute of the Academy has regarded the main task of its cartographic department as the drawing up of a new basis and draft for an Atlas of Poland, which, while making use in part of the material now available, would constitute a compact whole, comprising both physical and economic material. The draft atlas has been worked out and discussed during 1956. Documentation is also undertaken within the Geographical Institute of the Academy, including bibliography, work on Polish place-names, geographical terminology and the critical evaluation of statistical and cartographical sources.

It is not easy to estimate the achievements of one's own field in science. Such an estimate could more easily be made by a comparison with the achievements of the same branch of science in other countries, or by an outside observer. After an interval of several years employed in discussion and establishing its methodological foundations, its direction and problems of research and, most important, its aims and scope, Polish geography has now emerged into the daylight. In 1955, Polish geographers took part in the second All-Union Congress of the Soviet Geographical Society in Moscow, and read a number of papers. In 1956, a delegation from Poland took part in the International Seminar at Aligarh (India), and presented some of the results of their research. Polish geographers have also taken part in congresses and conferences in East Germany, Hungary and Romania. Soviet, French, German and Czech geographers have visited Poland during recent years

and have expressed appreciation of the achievements of some branches of Polish geography. Polish geographers also cooperate with the International Geographical Union, and take part in some of its commissions; a delegation attended the 18th International Geographical Congress at Rio de Janeiro, read there several papers, presented maps and publications and took part in discussions.[42] Some Polish geographers were elected to I.G.U. Commissons.

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AIR SURVEY OF THE NEW ZEALAND ALPS

N. E. ODELL

THE SOUTHERN ALPS, forming the eccentric backbone of the South Island, and extending some 250 miles up and down its western side, have been in process of gradual exploration from the early days, by prospectors, local surveyors, sheep-run holders, hunters and mountaineers. But extensive areas of the inner and higher portions of the region have remained scarcely known and entirely untraversed, the remoteness and inaccessibility of some parts being extreme, and the western side notorious for its almost impenetrable bush. No adequate survey of the region has ever been carried out, and even the position of many of the chief peaks, obtained where visible from the low country by intersection, can only be considered approximate. The Department of Lands and Survey has never as yet undertaken a comprehensive topographical survey of the main range of the Alps; and the New Zealand Geological Survey, on account of stringent economy and shortage of staff, has not thought fit to embark upon a detailed investigation, whether for scientific or for uncertain economic purposes. In a country of so small a population, and with a very limited tourist industry, the public, including mountaineers, geologists or other scientific travellers, have had to be content with a general map on a scale of 1 : 253,440, or 4 miles=1 inch, except for the Mount Cook Alpine Regions sheet on a scale of 1 : 100,000, or 1 mile $=\frac{2}{3}$ inch (New Edition 1953). But of the general (4 miles=1 inch) map only the northern half has so far been published, the portion west of longitude 170° still being in the draughting stage. There has, however, been an increasing demand of late for adequate topographical maps, and problems in connection with the geology of the Southern Alps have remained an important consideration. Consequently, the time seemed ripe for the formulation of some plan that would enable both topography and geology to be reconnoitred and mapped as quickly and economically as possible. Only by aerial means could such a project be carried out.

After discussions in Wellington between the Air Operations Branch and the writer, a beginning was made in 1953 by a squadron of the R.N.Z.A.F. (Wigram), who kindly undertook to include a small project of air photography in its routine training flights. This first project, essentially for glaciological purposes, covered by means of a vertical mosaic the Tasman, Hooker, Franz Josef and Fox Glaciers in the central Alpine region; but unfortunately, owing to delay until after the arrival of the first winter snowfall, there was much masking of important surface features, and a great opportunity was largely wasted.

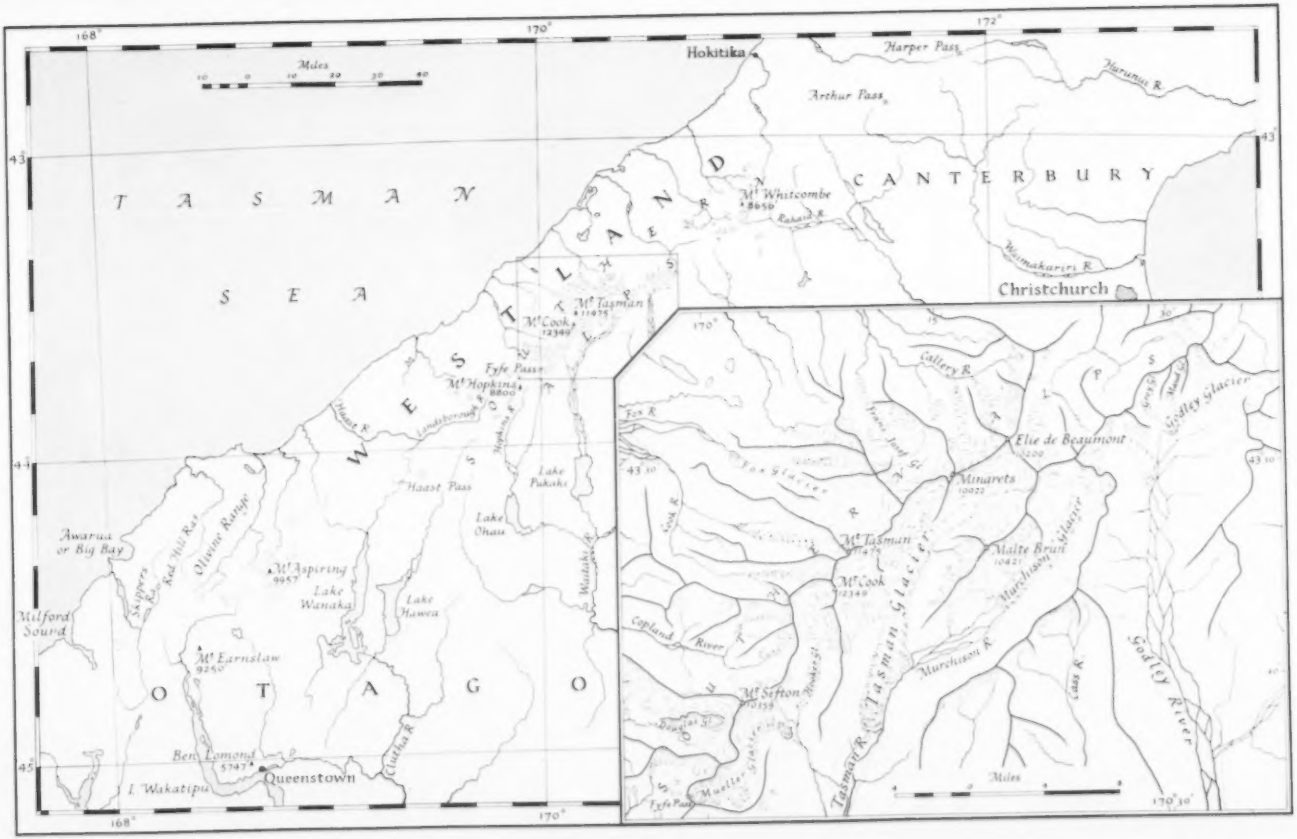
In 1954 the Central Photographic Establishment of the R.N.Z.A.F. at Ohakea, North Island, was good enough to accept my proposals for an oblique photographic cover of as much of the main range as possible, but in the event likely to be confined to the northern portion, between Harper Pass [1] on the north-east and Fyfe Pass at the south-west end. Oblique photography, relatively to a vertical cover, implied a great reduction in flying time, and, moreover, the provision of photographs in which one could better observe the geological structures visible in mountain faces

[1] Harper Pass, or Hurunui Saddle, 3152 feet, was named in memory of Leonard Harper (first President, in 1891, of the New Zealand Alpine Club). This feature is to be distinguished from Harper Saddle, 8559 feet, in the Mount Cook district, which was named after Arthur Paul Harper, son of Leonard (first Secretary, and later President of the N.Z.A.C.)

and ridges. At the same time, it was hoped to use these photographs for photogrammetric purposes, where trigonometric ground stations could be identified. But to the geologists the essential requirement of the air photographs would be the evidence of structural and tectonic features from indications of bedding, folding or faulting, and their likely changes from place to place. Armed with local photographs, important features and key locations could then be reached on the ground, and the necessary detailed examinations made. Only in this way would it be possible to obtain an adequate idea of the structural units, and the tectonic relationships, of the vast block of greywackes, argillites and schists of which it has been generally known, or surmised, the main range is composed. For this monotonous block of undifferentiated Permian-Triassic-Jurassic sediments of the Hokonui system, with metamorphic phases, has none of the variety in composition and structure of the European Alps, for instance, where it is possible to trace "marker beds," for identification purposes, laterally through extensive portions of a formation. Nor have the Southern Alps proper any igneous intrusive or extrusive rocks present to relieve the prevailing uniformity of structure and form. Only in the extreme south-west, bordering on Fjordland, is there any extensive area underlain by intrusives. Of these the principal types are dioritic, and also ultrabasic, particularly in the interesting belt of rugged country known as the Red Hill Ranges. From the air the contrast in colour of the latter with the mainly dull greys of the rocks of the Southern Alps proper is most striking. Although for the general purposes of map-construction it would have been an advantage to carry out a vertical photographic mosaic, from an altitude of perhaps 20,000 feet, I was warned at the outset that no aircraft was available in New Zealand whose "ceiling" was greater than 14–15,000 feet, under optimum conditions. Since Mount Cook is 12,349 feet, and several other summits are between 10–11,000 feet, any general use of " verticals " was consequently ruled out.

In a short article published in the *Alpine Journal* (No. 289, November 1954) I described my flights in 1954 under the extremely unfavourable conditions then prevailing. A R.N.Z.A.F. " Devon " aircraft had on two occasions picked me up at Hokitika in Westland in the hopes that continuous photography would be possible, but as the day progressed the Alps became masked in heavy patches of cloud and rain along both flanks of the range. This was in spite of good weather forecasts at Ohakea (North Island), whence the aircraft had taken off: an indication of the frequent sudden changes consequent upon the proximity of the Tasman Sea. Systematic photogrammetric work was, of course, out of the question, and we confined ourselves to searching out emergent summits, whose structures called for particular study. But it was tricky and perhaps somewhat hazardous flying, and a deterioration in conditions forced our early return.

In April 1955, when one was already fearing that the first heavy falls of winter snow would cover up many of the important geological features, another opportunity to continue the survey project was obligingly provided by the Central Photographic Establishment of the R.N.Z.A.F. (Ohakea). Most fortunately this offer came just a few days before severe storms of wind and snow, which blanketed the whole of the ranges. Accordingly on April 20, accompanied by Mr. B. M. Gunn, a post-graduate student from my department at the University of Otago, and himself a geologist-mountaineer, we took off from Dunedin airport at Taieri in a " Devon " communications aircraft. This had been fitted for the project with a R.A.F. Aircraft camera, Type F.24, Universal, and provided with a Pentac lens of focal length $8^{1}/_{16}$ inches. The camera mounting was of R.A.F. type 25, fitted to a R.N.Z.A.F. (Ohakea)-designed door-plate suitable for a Devon communications

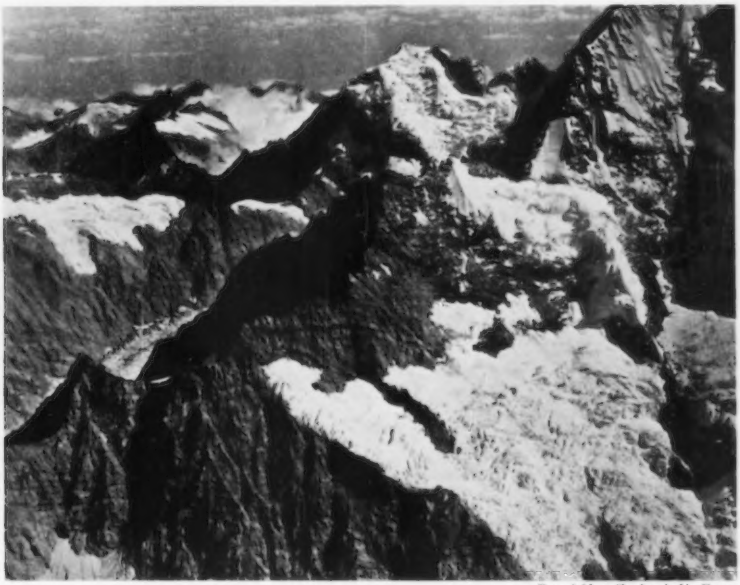

168°
170°
172°
Miles
10 0 10 20 30 40
Hokitika
Harper Pass
Arthur Pass
Harunui R.
43°
T A S M A N
S E A
S O U T H I S L A N D
C A N T E R B U R Y
Mt Whitcombe
8050
Rakaia R.
Waimakariri R.
Christchurch
Mt Tasman
11475
Mt Cook
12349
Fyfe Pass
Mt Hopkins
8800
Hooker R.
Landsborough R.
Hopkins R.
Haast R.
Haast Pass
Lake Pukaki
Lake Ohau
Wanaka R.
Awarua or Big Bay
Olivine Range
Red Hill Ra.
Skippers
Mt Aspiring
9957
Lake Wanaka
Lake Hawea
Milford Sound
Mt Earnslaw
9250
O T A G O
Ben Lomond
5747
Queenstown
L. Wakatipu
Clutha R.
44
45
168°
170°
Gillery R.
Fox R.
Fox Glacier
Franz Josef Gl.
Elie de Beaumont
10200
Minarets
10022
Mt Tasman
11475
Mt Cook
12349
Malte Brun
10421
Marchison Glacier
Copland River
Copland Pass
Mt Sefton
10359
Douglas Gl.
Douglas Spur
Tasman R.
Tasman Glacier
Marchison R.
Cass R.
Godley Glacier
Godley River
Mueller Glacier
Fyfe Pass
Miles
170° 10'
43° 10'

Royal New Zealand Air Force

Mount Aspiring (9957 feet) from the east, showing Kitchener glacier on left, Volta glacier on right. Olivine range in distance, partly in cloud

Royal New Zealand Air Force

La Pérouse (10,101 feet), Mount Cook (12,349 feet) and Mount Tasman (11,475 feet) left to right; Hook glacier on left



Royal New Zealand Air Force

East face of Nazomi and Pibroc, showing recumbent folding of mudstone-siltstone series. South ridge of Mount Cook, upper right; La Pérouse in background

Royal New Zealand Air Force

Mt. Moffat (8647 feet) and Gino Watkins Glacier (upper) showing ruling strike and south-east dipping greywackes and argillites, or sub-schists

Royal New Zealand Air Force

Complementary retreatal (?) moraines of Grey and Maud glaciers, both tributary to Godley glacier terminal moraine

Royal New Zealand Air Force

Mount Ward (centre) and Foster glacier, high above Thompson stream; a rejuvenated and over-deepened "hanging" tributary to the Hopkins river (foreground)

Royal New Zealand Air Force

Mount Hopkins (left) from the east, and Hourglass glacier. Rock face shows local folding and thrusting of greywacke series, overlain by horizontal black argillites

East face of Mount Tasman (11,475 feet) and Haast ridge (centre) with Hochstetter icefall draining from the Grand Plateau

Royal New Zealand Air Force

aircraft. For the purposes of this operation the camera was depressed 16° from the horizontal. I had hoped that a certain amount of vertical photography would also have been possible in some prescribed areas, particularly the Franz Josef and Fox Glacier basins, but unfortunately owing to a misunderstanding the aircraft detailed for the operation was not provided with this means.

Flying from Taieri westwards over the semi-arid upland tracts of Central Otago, characterized by their well-known " range-and-basin " structure and interspersed with meandering rivers, our aircraft soon brought us over beautiful Lake Wanaka, with huge arms of vivid blue water penetrating deeply into the mountains. Unmistakable ahead was the symmetrical pyramid of Mount Aspiring, 9957 feet, the highest point in Otago, to which we flew, making in a number of traverses along its eastern and northern flanks photographic records of its bedded formations, both regular and irregular, from a distance of 1000 yards or more. We then flew northward along the eastern side of the main range with the aerial camera in continuous operation; and here we soon found ourselves viewing one of the lesser known portions of the chain, from the Haast Pass north-eastwards along the Hopkins River and its tributaries. Soon the great rocky snow-sprinkled wedge of Mount Sefton was conspicuous, and beyond, the supreme summit of Mount Cook (12,349 feet) showed signs of a cloud-film and an approaching deterioration in the weather. Quickly clouds began to bank up over the main range, obscuring so many features of importance that we had perforce to postpone the remainder of the flight programme and return to Dunedin. It may be noted incidentally that, irrespective of the frequent onset of " lows " on the Southern Alps from the direction of the Tasman Sea, there is a regular diurnal building-up of heavy cumulus masses along the whole range from about midday onwards, except during the winter season. On the following day (21 April 1955) we were favoured with remarkably good weather, even during the early afternoon period, except for a few scattered fracto-cumulus clouds. Flying directly from Taieri airport to the vicinity of Mount Cook, we continued farther to the northward our eastern photographic traverse which had been commenced the day before. Sweeping over one great eastward-flowing glacier after another, viz. Tasman, Murchison, Godley, Rakaia *et al.*, and noting certain unusual features in some of them, particularly in the case of the moraines of the Grey and Maud Glaciers, we continued on to the vicinity of Arthur Pass, and beyond to the neighbourhood of Harper Pass, which is often regarded, though somewhat arbitrarily, as the northern termination of the Southern Alps proper.

So far, we had confined ourselves to the eastern side of the main divide in order to obtain as complete and continuous a series of obliques as possible of this aspect. Now, our task was to supplement it with a corresponding series of the western flank of the range, which presents a more continuous front and rises from the shores of the Tasman Sea relatively so much more steeply. Accordingly, from over Arthur Pass we turned westwards and southwards, at first over more moderate topography which is characterized at lower elevations, in the experience of the writer, by some of the densest mountain bush country of the Temperate Zone outside the coast range of British Columbia. The photographic conditions were holding remarkably well as we flew on southwards, only a few clouds clinging to some of the lower summits. We were following approximately the trace of the great Alpine Fault, which constitutes such a marked structural, and in places topographical, feature of the western side of the Southern Alps. This important dislocation strikes for some 400 miles between 20° and 40° east of north, and it cuts off the younger sediments, as well as some igneous elements and older sediments to the northward, which lie along its western side, from the significant zones of

metamorphic rocks, covering high-grade kyanite-schists and greywackes, on the eastern or Alpine side of the fault.[1] This is not the place to discuss the interesting problem of the character of the Alpine Fault, and of the controversy that has arisen as to its true nature and mode of movement; nor as seen from the air, in swift passage along it, could one hope to contribute anything concrete to that problem. Rather was one much preoccupied with the conspicuous blocks of moderately dipping strata by which many of the peaks of the main divide, particularly from Mount Whitcombe southward, were built up, and also by the way in which many of these blocks seemed to have been individually moved round and rotated out of the ruling line of strike. This phenomenon seems worthy of further attention, when field parties, provided with air photographs, can make local and detailed examination. In such a future examination by the geologist-mountaineer, which it is hoped will not long be delayed, must be included many interesting problems of bedding, of folding and faulting, and other structural features of the inner parts of the main range. These have hitherto been entirely neglected and certainly seem worthy of inclusion in the general pattern of New Zealand's many outstanding scientific problems, whether or not there be any direct economic outcome of such studies. Incidentally, it is probably true to say that less is known about the "anatomy" of the Southern Alps than any other mountains of the Temperate Zone. For we are as yet ignorant as to the true nature of folding and faulting in this great range, whether on the eastern or the western side of the main divide proximate to the Alpine Fault (referred to above), with which the stress-pattern of the range may tectonically be connected. What we do know from our aerial as well as ground investigations is the presence of a good deal of isoclinal and even local recumbent folding, with some over-thrusting in the beds adjacent to the main divide.[2] So far, however, no extensive over-thrusting has been recognized. These mountains give no indication of the well-known nappe tectonics of the European Alps and some other ranges.

There can be few more impressive sights than the immense wall of the main range in the neighbourhood of Mounts Cook and Tasman, when one is poised in space over the coastal lowlands. The full stature of these and innumerable other peaks became apparent as we flew southwards; and equally impressive were the great dissecting valleys with their many steep glaciers descending from high névé basins, at times through some 8000 feet, as in the case of the Fox and Franz Josef Glaciers, into the almost sub-tropical bush of the coastal tract and terminating not more than 700 feet above sea-level. On the southern flank of Mount Sefton it was interesting to note the large amount of recession in the Douglas Glacier, which not many decades ago cascaded from its shelf high on the mountain over a precipice of some 2000 feet, forming at that time one of the great, but perhaps less known, sights of the Southern Alps. Nowadays, in common with most other glaciers, it has thinned and retreated, and its phenomenal and thunderous discharge has ceased. Elsewhere, incidentally, it is proposed to comment upon these and other features of New Zealand glaciers.

All too soon we had passed by Mount Hopkins and many other summits of the long and unfrequented tract of the range from Mount Sefton to Mount Aspiring. Many features and problems of complex orography will be elucidated by a study of the air-photographs of this region. In this connection, the latter have already

[1] Lillie, A. R., and B. H. Mason: "Geological Reconnaissance of District Between Franz Josef Glacier and Copland Valley." *Trans. Roy. Soc. N.Z.*, **82**, 5 (1955).

[2] See for example, J. B. Waterhouse: "An Isoclinal Fold on Häckel Peak, New Zealand." *Trans. Roy. Soc. N.Z.*, **83**, 2 (1955).

served a useful purpose in connection with some of the pioneer explorations of Charles Douglas, whose diaries and outstanding work with A. P. Harper during the '80s and '90s of the last century will soon, it is hoped, be published under the editorship of Mr. John Pascoe. Moreover, as a result of the all-seeing eye of the air-camera, several small glaciers and minor peaks in the higher recesses of the mountains seem to have revealed themselves for the first time, and even portions of the main divide may have to be corrected on future maps.

The prevailing colour of the rocks of the Southern Alps proper is grey, which befits a formation predominantly of greywacke. This is only relieved locally by darker grey or black strata of argillite, which is often interbedded with the greywacke, thus providing evidence of folds and faults where present. In the zone of schists on the western flank of the main range, and where not masked by forest, a limited amount of brownish or reddish tone is seen, but, as stated above, nowhere can be observed igneous intrusions or extrusions to break the monotony of structure and form of these mountains. This condition obtains from the extreme north through some 350 miles to the neighbourhood of Mount Aspiring and beyond. In marked contrast is the region to the west and south-west of Aspiring. Here are situated the Olivine Range and the Red Hills, underlain in part by ultrabasic intrusive rocks, while south of them in Fjordland are mountains mainly composed of diorite-gneisses and other crystallines. We now flew to the former groups lured on, as were indeed both our pilot and navigator, by the wonderful change from uniform grey to the rich russet hues of the weathered peridotite in particular of the Red Hills. For not only did these ruddy hilltops provide an attractive change in colour, but their lower flanks were more extensively exposed and unmasked by forest cover, due no doubt to the deleterious effect on the latter by the magnesia-rich rocks of which they are composed. Indeed, this belt of peridotites, with its locally associated " greenstone " (jade, or specifically bowenite), continues as a significant formation across, and to the southward of, Milford Sound, where its rusty outcrops, with sparse vegetation, form a conspicuous feature of the landscape.[1] Beyond Red Hill itself, the culminating point of the Hills, lay the Skippers Range, as yet little known topographically or geologically; and beyond again we caught a glimpse of Awarua, or Big, Bay on the gleaming waters of the Tasman Sea. But time and petrol were our limiting factors, and it was now necessary to return to base. So turning south and then south-east, we made for the massive twin-summits of Mount Earnslaw (9250 feet), and passing closely by the fine glaciers descending its northern and eastern sides, we headed for the brilliant blue waters of Lake Wakatipu. Then, passing over the flank of Ben Lomond, we swooped down towards the pleasant lakeside resort of Queenstown, nestling in its picturesque bay, and again rose to traverse the semi-arid and relatively monotonous tracts of Central Otago. We landed finally at Taieri airport for Dunedin. We had flown for precisely four hours and thirty-five minutes, and in this spectacular flight had covered the Southern Alps almost from end to end, namely from Harper Pass to Mount Earnslaw, or about 230 linear miles of mountain chain.

Acknowledgement.—With other interested geologists in New Zealand I wish here to record my sincere appreciation of the above photographic project for which permission was given by the N.Z. Air Department and which was so admirably executed by the Central Photographic Establishment of the R.N.Z.A.F. at Ohakea. Grateful thanks are also due to the latter for the fine series of air-photographs that have been supplied to the Society, some of which illustrate this article.

[1] Odell, N. E.: "Sutherland Sound, Southland, New Zealand." *Geogr. J.*, **118** (1952) 368–9.

SOME PHYSICAL ASPECTS OF THE INSHORE ENVIRONMENT OF THE COASTAL WATERS OF THE UNITED STATES AND MEXICO

RICHARD H. FLEMING AND F. E. ELLIOTT

IN RECENT YEARS both economic and military interests have stimulated the investigation of the oceanography of the coastal waters, usually in the form of detailed surveys of limited areas. It was to bring together some of these data and also to emphasize the value of the geographic approach in oceanography that the authors undertook this study. It is not the object of this paper to enumerate all the various physical, chemical, biological, geological and meteorological elements that constitute marine environments and it is sufficient to point out that in general all of them have their greatest spatial and time variability in the coastal waters. It is therefore important to identify some of the major aspects of the regional variability and, if possible, to determine the causes. Equally important are the nature and magnitude of the seasonal variations because these are significant in marine environments.

Coastal waters can only be defined in very general terms. Even the landward margin is not a sharp one, but varies with the level of the tide, the waves, the weather conditions and eustatic changes of sea level. Seaward there is no real margin but rather a gradual transition to the more uniform oceanic conditions characteristic of the latitude and general ocean area. No attempt is made in this paper to set any precise limit to the width of the coastal waters but in general the discussion will deal with the zone corresponding roughly to the continental shelf. The material in this paper is based on a series of figures prepared to illustrate a wide variety of conditions in the coastal waters of the United States and Mexico. Limitations on publication made it necessary to eliminate six of the ten illustrations, consequently only major features of the river run-off, coastal classification, temperature and salinity conditions are described in any detail. Topics for which no illustrations are included, such as prevailing winds and currents, tides, and the nature of bottom sediments are reviewed briefly in later sections of the paper.

Two main objectives have been kept in mind: first, to present geographically certain information to determine to what extent correlations and contrasts throw light on cause and effect relationships; second, to consider what are the principal factors that establish the local conditions and control the regional variability. It was necessary to take into account the drainage basins, the flow of the major rivers and the burden of sediment they carry to the sea. The presence or absence of coastal indentations, barrier islands, river estuaries, are major factors in the inshore environments, as well as the width, topography, and sediments of the continental shelf. In an attempt to synthesize this material, a broad system of coastal classification was developed. Because of scarcity of data the study was limited to the coastal waters of the United States and Mexico. Even so, there are many gaps and it is hoped that this preliminary analysis will stimulate investigators to broaden their field investigations and to undertake similar analyses for other regions.

Figure 1, showing the major drainage basins of the United States and Mexico, has been prepared to demonstrate the chief regional features of the supply of fresh water and sediments to the oceans. The inset diagram in the lower left-hand corner

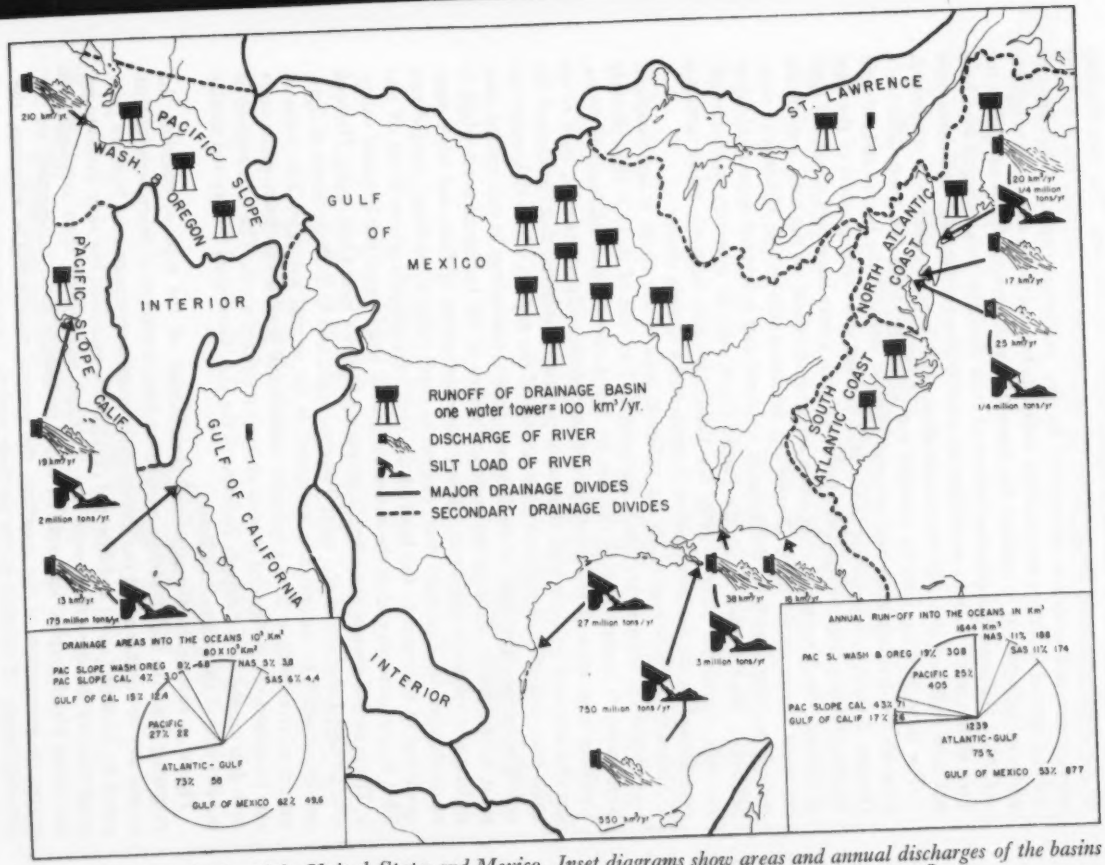


Fig. 1. Drainage basins of the United States and Mexico. Inset diagrams show areas and annual discharges of the basins

shows the total drainage area emptying into the sea (80×10^5 km.^{2}) and the percentages and areas of the individual regions outlined on the map. The inset diagram in the lower right-hand corner shows the total annual run-off (1644 km.^{3}) and the percentages and amounts contributed by the individual regions. The data for average annual discharge are relatively complete but only for a few rivers was there adequate information to indicate the amount of sedimentary debris carried to the sea. Only the most conspicuous features of river discharge and sediment load have been shown and it must be noted that the contributions of the Canadian rivers have not been included, although these must affect near-shore oceanographic conditions.

The most striking features brought out in Figure 1 are the great differences between the drainage areas and volumes of water entering the Pacific and Atlantic Oceans. Nearly three-quarters of the area drained and three-quarters of the total discharge empty into the Atlantic Ocean. Of this, a very large part enters the Gulf of Mexico, the Mississippi river alone carrying one-third of the total run-off for the areas shown on the map. Despite the dominant role of the Mississippi river, there is no long stretch on the Atlantic seaboard that is without appreciable river discharge. On the other hand, the Pacific Coast with its relatively small run-off, has only one major river system, the Columbia, and relatively minor amounts contributed by the Sacramento-San Joaquin and Colorado rivers.

Although the information on the sediment load of the rivers is not complete, several general features are easily recognized. The first of these is the relatively large amounts contributed to the sea by the Colorado and Mississippi rivers. Draining large areas of sedimentary rock and unconsolidated material, both rivers are characterized by their high content of particulate material that has shaped the coast lines and affected the geological history of the regions where they enter the sea. The average daily load of the Mississippi river amounting to two million tons must have a direct effect on the eustatic changes of the Louisiana coast which is sinking at a relatively rapid rate. Before the construction of dams and other man-made changes, the Colorado river, despite its small volume discharge, carried vast quantities of sediment to the head of the Gulf of California where it cut off and filled in the northern end of the structural graben and formed the Imperial valley.

The principal sources consulted in preparing Figure 1 were Clark, 1924; Harbeck *et al.*, 1949; Langbein *et al.*, 1949; Tamayo, 1946; and U.S. Department of Agriculture, 1949. The information presented is for annual averages. The seasonal pattern of river outflow is an important variable and year to year fluctuations must also be considered in detailed studies of more restricted areas. The best sources of such data are the Water Supply Bulletins of the U.S. Geological Survey and similar publications of the individual States.

Figure 2 represents a generalized classification of the type of coastline. In preparing this map the objectives were to combine a number of characteristics that in one way or another affect the nature of the marine environments. Systems proposed by Johnson (1919) and Shepard (1937) were examined but were found to be unsatisfactory because they were too localized and placed their emphasis on individual physiographic features. In order to include some information on the degree of indentation of the coastline, the general nature of the substrata, the potential supply of sediment to the sea floor, and the broad aspects of the nature of the continental slope, it was necessary to develop the system employed in Figure 2. Two general items were considered, the origin of the coastal materials and whether erosion or deposition had in recent geological time been the dominant process. Glaciation has played the principal role in shaping the northern coasts, and on the

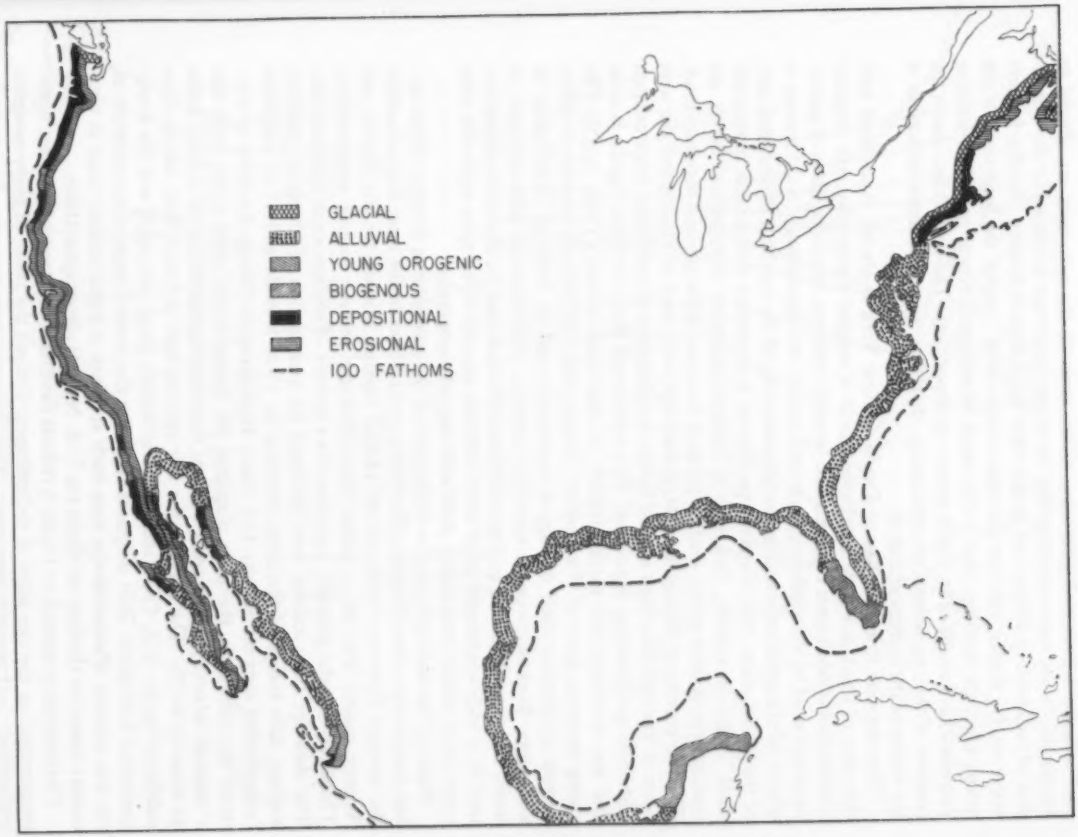


Fig. 2. Classification of the coastline of the United States

eastern seaboard it was possible to indicate two sub-areas, a northern one where the coast has been shaped by erosional glaciation, and to the south the morainal features that indicate depositional glaciation. Other areas on the east coast are alluvial or biogenous, in one case indicating that the coasts have been produced by the deposition of sedimentary debris, and in the other by biological activity. Similar features occur on the Pacific side but the most conspicuous type on the west coast is the young orogenic coastline that is the result of relatively recent mountain-forming processes later modified by either erosion or deposition. The pecked line shows the position of the 100-fathom contour and is, therefore, an approximate indication of the width of the continental shelf.

The coastline from the Bay of Fundy to New York is glacial. Associated with this type of coast is a wide continental shelf of rugged topography and irregular distribution of sediments characterized by rock outcrops, boulders, areas of gravel, sand and mud in the shallower parts and mud in the depressions. Sand bottom is absent off the erosional coastline and appears only off the southern depositional part of the glacial coast. The alluvial type of coast is associated with a wide continental shelf, relatively smooth, and with a uniform sediment distribution. Sands are dominant in shallow water, grading seaward into sand and mud, and then into mud. The two regions of biogenous coast, namely the west coast of Florida and the west coast of Yucatan have been shaped by the development of corals and other calcium carbonate-precipitating organisms. The continental shelf off these regions is wide and the sediments are predominantly of calcareous nature (Trask, 1937). The young orogenic coast of Washington, Oregon and California is associated with a narrow continental shelf of rugged topography and an irregular distribution of sediments. Rock outcrops are relatively common. Sediments are sand and mud, or mud. Because of differing geological histories the east coast is, in general, characterized by a wide continental shelf with relatively smooth topography while the west coast has a narrow continental shelf with rugged topography.

Figure 3 has been prepared to show some of the conspicuous features of the surface temperature distributions. The heavy pecked lines in the inset diagrams show the average February temperatures plotted against latitude for the Pacific and Atlantic coasts. The heavy dotted lines show the average August temperatures. These two months generally represent the extremes of surface water temperatures. The data for these curves were obtained by examination of charts of monthly average data compiled for areas enclosed by 1° of latitude and 1° of longitude (unpublished data on file, the U.S. Navy Hydrographic Office). In order to construct the curves in the inset diagrams the temperatures were taken from the 1°-squares adjacent to the coast and are therefore representative of a band some 50 miles in width. The data for the tide stations were selected from information published by the U.S. Coast and Geodetic Survey (1947 and 1948) and the heavy horizontal bars in the inset diagrams represent the annual range of temperature at the tide stations. Plotted on the map itself are lines of equal annual range in temerature based on the data on file in the U.S. Navy Hydrographic Office.

The material presented in Figure 3 reflects the broad differences in surface water temperature on the two sides of the continent that are the result of many complex atmospheric and oceanic processes. The February temperatures, for example, gradually increase from about 8° C. off the coast of Washington to 21° C. off Lower California, whereas off the eastern seaboard in corresponding latitudes, they increase from about 2° C. to 25° C. with a marked discontinuity in the latitude of Cape Hatteras. The greater latitudinal change in temperature along the east coast can be

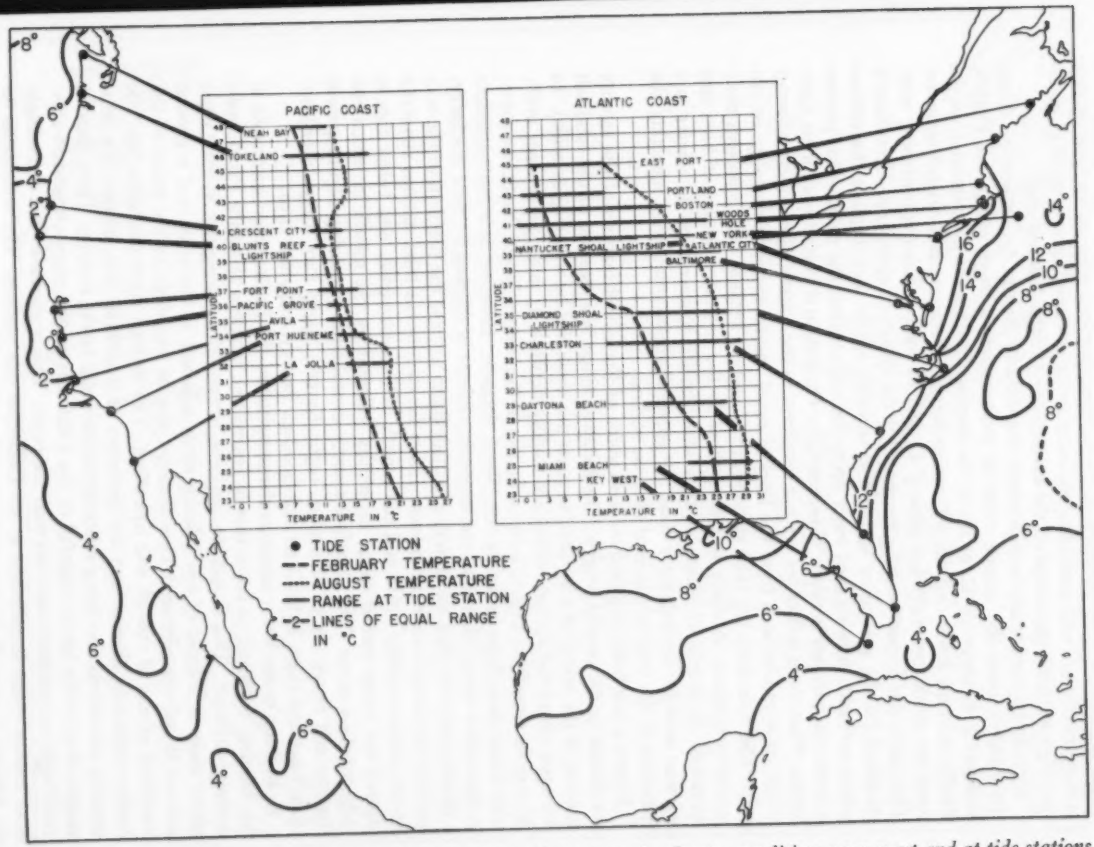


Fig. 3. Annual range of sea surface temperatures (monthly averages). Insets: conditions near coast and at tide stations

attributed in part to the influence of prevailing winds and in part to the nature of the currents. Cold continental air pouring out over the north-eastern coast is reflected in the near-freezing temperatures in the northern portions whereas the Gulf Stream flowing northward and paralleling the coast as far as Cape Hatteras tends to maintain high water temperatures off the southern part of the Atlantic coast.

Equally impressive are the differences displayed by the two August curves. Along the Atlantic coast the annual range in temperature is large, except off Florida, amounting to about 10° C. or more. In contrast the August temperatures on the Pacific coast are lower and the differences between February and August temperatures are small, generally less than 5° C. and in some regions approaching zero. This particular feature must be attributed to the effects of upwelling. Upwelling is produced by the prevailing spring and summer winds that displace the surface waters seaward, drawing cool water up to the surface near the coast. This process is most conspicuous between Crescent City, Oregon, and Point Conception, California. That these influences are not restricted to the waters immediately adjacent to the coast can be seen from the lines of equal annual temperature range on the map. The data from the tidal stations are of interest because they represent truly coastal conditions, in many instances those in the protected waters of bays and estuaries. In nearly all instances they show cooler temperatures in winter and warmer summer temperatures than the adjacent ocean areas, thus reflecting the influence of the local continental climatic regime.

Figure 4 has been prepared to show some of the salient features of the salinity conditions in the coastal waters. The salinity, which is a measure of the total salt content of the water, is expressed in parts per thousand by weight (per mille). In the open ocean the surface values are usually between 33 and 37 parts per mille. As may be seen from Figure 4, the salinities in the eastern North Pacific are somewhat lower than those in the western North Atlantic. However, it is the conditions in the coastal waters that show the immediate effects of dilution by river discharge. Unfortunately the data on salinity are inadequate to treat the problem in the way used for the temperature conditions. Insets for each of the tidal stations show the lowest mean monthly value and the month of its occurrence, and below this is entered the mean annual range in salinity followed by the month in which the highest values occur. The principal sources consulted in preparing Figure 4 were Bigelow and Sears, 1935; Böhnecke, 1936; Kerner, 1937; Parr, 1935; Sverdrup, 1943, 1944 and 1947; U.S. Coast and Geodetic Survey, 1949 and 1950.

In addition to the lower salinities characteristic of the Pacific when compared to the Atlantic, it should be noted that in general the salinities along the Pacific coast decrease seaward. This is just the opposite to conditions along the Atlantic coast where there is a band of low salinity water adjacent to the coast and a general increase in salinity seaward. This situation can be explained as the result of the combined effects of run-off and upwelling. The limited river discharge into the Pacific minimizes dilution and the processes of upwelling that affected the temperature conditions also bring relatively saline water to the surface. These factors, combined with the limited rainfall of the California coastal region, maintain relatively high and uniform salinities near the coast. This is shown by the exceedingly small annual range in salinities at the California tide stations. The conditions on the Atlantic Coast reflect the greater river discharge, the absence of upwelling, the southward flow of water adjacent to the New England coast, and the high salinity water transported northward and offshore by the Gulf Stream.

Among the phenomena not illustrated in this paper are the prevailing winds.

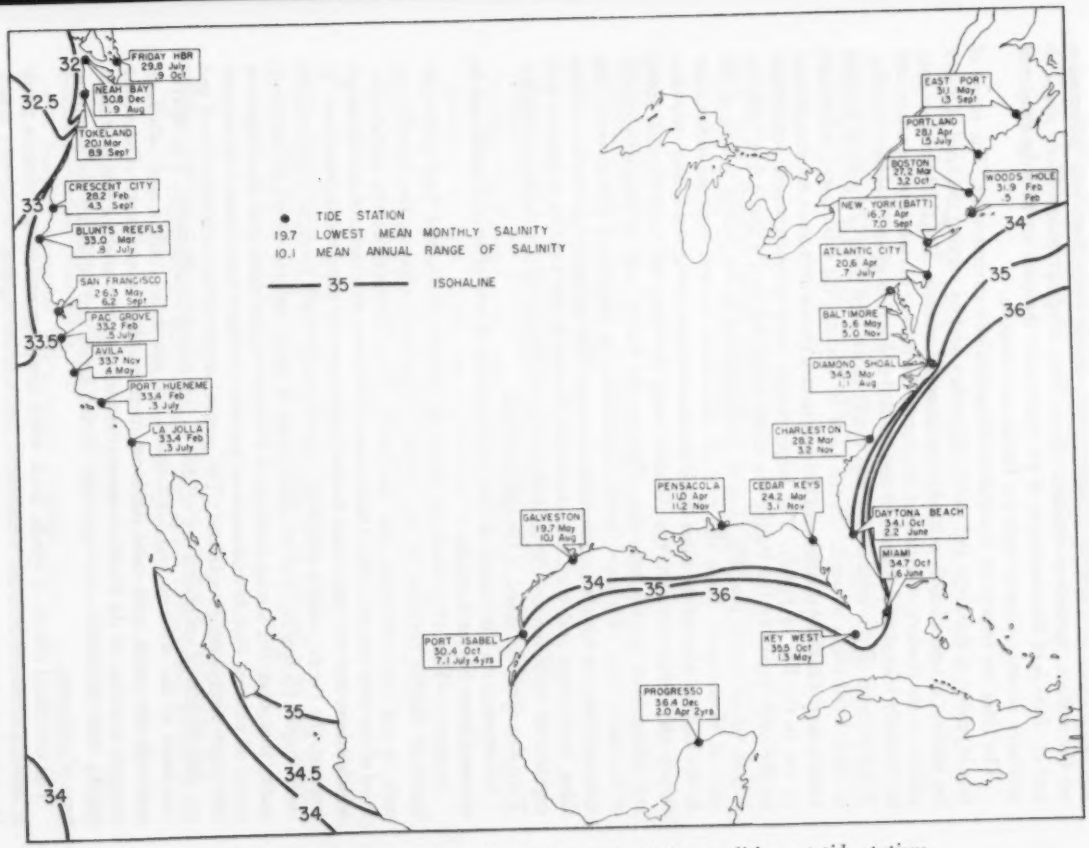

TIDE STATION
19.7 LOWEST MEAN MONTHLY SALINITY
10.1 MEAN ANNUAL RANGE OF SALINITY
35 ISOHALINE
FRIDAY HBR 29.8 July 9 Oct
NEAH BAY 30.8 Dec 1.9 Aug
TOKELAND 20.1 Mar 8.9 Sept
CRESCENT CITY 28.2 Feb 4.3 Sept
BLUNTS REEFLS 33.0 Mar .8 July
SAN FRANCISCO 26.3 May 6.2 Sept
PAC GROVE 33.2 Feb .5 July
AVILA 33.7 Nov .4 May
PORT HUENEME 33.4 Feb .3 July
LA JOLLA 33.4 Feb .3 July
EAST PORT 30.1 May 1.3 Sept
PORTLAND 28.1 Apr 1.5 July
BOSTON 27.2 Mar 3.2 Oct
WOODS HOLE 31.9 Feb .5 Feb
NEW YORK (BATT) 16.7 Apr 7.0 Sept
ATLANTIC CITY 20.6 Apr .7 July
BALTIMORE 5.6 May 5.0 Nov
DIAMOND SHOALS 34.5 Mar 1.1 Aug
CHARLESTON 28.2 Mar 3.2 Nov
PENSACOLA 1.0 Apr 11.2 Nov
CEDAR KEYS 24.2 Mar 3.1 Nov
GALVESTON 19.7 May 10.1 Aug
DAYTONA BEACH 34.1 Oct 2.2 June
MIAMI 34.7 Oct 1.6 June
PORT ISABEL 30.4 Oct 7.1 July 4yrs
KEY WEST 35.5 Oct 1.5 May
PROGRESSO 36.4 Dec 2.0 Apr 2yrs
32
32.5
33
33.5
34
34.5
35
36

Fig. 4. Average surface salinity distribution and salinity conditions at tide stations.

However, some idea as to these conditions can be obtained from any good atlas, and detailed information from U.S. Weather Bureau (1938). Their principal effects on the temperature and salinity conditions have already been described. Information on the surface currents is available (U.S. Navy Hydrographic Office, 1943a, b and c). Details of the circulation of the waters near the coast are now the subject of intensive investigations in both the Pacific and Atlantic.

The tides are important features of the near-shore environment. The range of tide is related to the slope and width of beaches, and by varying the level of attack by waves it is undoubtedly related to processes of erosion. The tidal currents contribute to the flushing of estuaries, accelerate the mixing of river and sea water, and are directly related to processes of erosion and deposition of sedimentary material. A comparison of the tides on the two coasts shows that there is a general increase in range from south to north. In the Gulf of Mexico the tidal range is between 1 and 4 feet. On the Atlantic coast the ranges vary from 1 foot to an extreme of over 35 feet in the Bay of Fundy. The larger ranges occur in embayments rather than on the open coast. In the Pacific the range varies between 2 and 9 feet, with the largest values in and near the Gulf of California and in the inland waters of the state of Washington. Even the type of tide shows marked regional differences. In the Gulf of Mexico the tides are of the diurnal type, rising and falling only once during each lunar day. On the Atlantic coast the tides are semi-diurnal, rising and falling twice in each lunar day. Tides on the Pacific coast are characteristically of the mixed type, with large diurnal inequalities. In this type of tide there are two tides each day but with large differences in range. The regional characteristics of the tides, both range and type, are controlling factors in the inter-tidal zone as they regulate the frequency and duration of periods of exposure of the plants and animals. They also affect the speed of the tidal currents.

Information on the nature of the continental shelf and of its sediments can be obtained from Shepard (1948).

Summary.—The river discharge from the United States and Mexico is very unevenly divided between the two coasts, 75 per cent. entering the Atlantic and only 25 per cent. emptying into the Pacific. The Mississippi alone carries one-third of the total run-off. The Atlantic and Gulf coasts are chiefly of alluvial origin which means that they have been formed and shaped by depositional processes. In contrast, the Pacific coast is primarily of geologically recent orogenic origin and has been shaped by marine erosion. Exceptions to these statements are the northern coasts that bear the strong imprint of Pleistocene glaciation and the biogenous coasts of western Florida and western Yucatan that have been formed by calcium carbonate-precipitating organisms. The general nature of the continental shelf and the distribution of sediments are related to the coastal classification. The alluvial coastlines of the Atlantic and Gulf coasts are associated with a wide shelf, of relatively low relief, with sand the most frequent type of sediment. The young orogenic coastline of the Pacific is associated with a narrow shelf of irregular topography with numerous rocky outcrops. Mixed sands and muds are the dominant type of sediment.

The combined effects of winds, fresh water discharge and ocean currents result in striking contrasts between temperature and salinity regimes on the two coasts. In general the latitudinal change in the temperature of the surface waters is greater on the Atlantic coast than it is on the Pacific shore. Furthermore the difference between winter and summer temperatures usually exceeds 10° C. on the Atlantic and is generally less than 5° C. on the Pacific. Along parts of the coasts of Oregon and

California the range is less than 2° C. Salinities in the Pacific are relatively low and show a decrease seaward. In the coastal waters of the Atlantic the salinities increase seaward. The general causes of these differences can be attributed to the inequality in fresh water run-off, the ocean circulation and the upwelling produced by the winds along the Pacific Coast.

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CHANGES IN LAND USE AND STOCK OVER ENGLAND AND WALES 1939 TO 1951

HILARY C. CHEW

DURING THE LAST two decades the changes in the economic status of agriculture in England and Wales have inevitably led to widespread modifications in farming practice, many of which spring directly from the compulsory cropping applied to all parts of the country with comparative uniformity during the war. Subsequent relaxation of controls in favour of planning, through such incentives as guaranteed prices and subsidies, allowed account to be taken of local conditions, and sufficient time has elapsed for farming to have reached approximate equilibrium in the new conditions of post-war economy. It seems appropriate, therefore, that a study should be made in the present period of agricultural prosperity, following the pre-war depression, of the extent to which farming over the country as a whole has been modified in response to the opportunities and necessities of the times. Ministry of Agriculture returns provide the only reliable and comparable information relating to the whole country and at present available for both the pre-war and post-war periods. Maps based upon 1939 and 1951 county statistics [1] give a general picture of regional contrasts over the country, revealing the more outstanding modifications and permitting comparison of the nature and degree of change characteristic in different environments. The distributions selected for discussion indicate how far arable land has supplanted permanent grassland and the purpose served by additional arable land, corresponding changes in stock numbers, and in the relative prominence of various groups of grazing stock. To minimize the disadvantages arising from the use of counties the maps have been checked and interpreted in the light of additional data.[2]

Changes in land use.—Figure 1 shows the proportion of the total area of crops and grass used primarily for supporting stock, either directly as grazing land or indirectly through fodder production. Everywhere the 1951 permanent grass acreage stands well below that of 1939; even the western upland counties and the established eastern arable counties show a decrease of 10 to 20 acres per 100 acres of total improved land. The maximum decrease of 30 to 40 acres has taken place in Midland and south-eastern counties, some of which in 1939 ranked with the western upland counties in respect of their high proportion of permanent grassland. The sum of permanent and temporary grassland reduces the difference between corresponding proportions for the two years most particularly in the western counties, but to only a limited extent in the Midlands, the Welsh Borderland and the south-east. Finally, the addition of the fodder acreage brings many of the western counties into the same shading group for both years, showing how small has been the change in the main aim of land use in these areas. The change has occurred in the means of achieving this aim.

More intensive improved grassland farming characterizes the upland counties with their climatic disadvantages for general crop production. In neighbouring counties with a larger percentage of lowland, especially on the lee-side of the uplands, improved and more self-sufficient stock farming has become dominant, with greatly increased acreages under both temporary grass and fodder crops. These changes are readily attributable to increased demands for stock products, especially milk, and hence the incentive to increase the land's stock-carrying capacity. Furthermore, the high price

[1] Ministry of Agriculture and Fisheries, Agricultural Statistics 1939 and 1951, England and Wales, Part I. H.M.S.O., 1947 and 1954.

[2] Articles published in agricultural journals have been used, especially a series of fifty short reports of agricultural districts written by District Advisory Officers and published in volumes 57–61 of the Ministry of Agriculture journal *Agriculture*.

and relative scarcity of fodder encourages home production, in order both to reduce farming costs by this means, and also to ensure sufficient supplies on the holdings lest a particular shortage in the market should result in a serious disruption of stock policy. Nevertheless the rigorous environment of the western uplands can clearly be seen to have limited the degree to which land use responded to these economic demands.

Further east and south-east, where permanent grass has given place to substantial acreages of fodder and temporary grassland, many counties are further distinguished by a well-marked increase in the acreages under crops for sale off the farms. Agricultural reports indicate that wheat, barley, potatoes and sugar-beet can be generally regarded as cash crops together with others less widely grown, chief among them fruit and vegetables for human consumption. The wartime expansion of this group of crops, everywhere common, was least marked in the western upland and dairying counties, and in these it has proved a purely temporary feature (Fig. 2). In the Midlands and the east, in contrast, in those areas where crop production was of negligible importance, the bulk of the much increased wartime cash crop area has been maintained or the acreage extended. Thus farming has gained greater stability from this development of a further significant source of income. The relatively clear-cut pattern of the reduction in grassland thus shows a maximum decrease, equalling about one-fifth of the total improved land in the Midlands and south-east, and a progressively smaller reduction towards the west, on the one hand, and the previously established arable eastern counties on the other. In the Midlands, fodder and cash crops occupy comparable proportions of the additional ploughland, though the latter are rather more prominent towards the east. Elsewhere fodder crops have expanded, more especially in the west, particularly in the lowland dairying counties; and cash crops in the east, where they have to some extent displaced fodder crops (Fig. 2).

Classified on the basis of these changes the counties fall into five major groups lying in compact blocks, giving an approximate regional division of the country[1] (Fig. 3). Uniformity within each group is in no way suggested. Within the first group, distinction must be drawn between areas with steep gradients and thin soils where ploughing is impracticable and the wider valleys, lowlands and low plateaus where the bulk of the temporary grassland and the limited fodder crop area occurs. Similar variations occur within the second group, and the main upland areas stand out distinctly from the adjacent lowlands on account of the lesser degree to which land use within them has been modified; this contrast is especially clear on the eastern borders of the uplands. On the Montgomeryshire–Shropshire border, for example, in 1951 many parishes of the upland valleys recorded over two-thirds of the improved land under permanent grass and of the arable land more than half was under temporary grass. In more easterly parishes at generally lower altitudes and with relief, soil and climatic conditions offering greater opportunity for tillage (though permanent grass had in 1939 occupied as much as 85 per cent. of the improved land) in 1951 about 50 per cent. was in arable use; this arable land was divided relatively evenly among cash crops, fodder and temporary grass. It is noticeable also that in areas laid out in small holdings of about 50 acres (especially if they are intensive dairy farms on medium to heavy land) relatively little change in land use remains and permanent grass occupies the bulk of the land despite the wartime extension of ploughing. This

[1] The counties have not been grouped strictly according to the exact quantitative degree of change indicated by the statistics but with reference also to additional data. The chief variation occurs in the case of Durham and the North and West Ridings which have been grouped with reference to the changes in their eastern areas. The prevalence of grassland farming in the Pennine Dales has been disregarded. It is thought that in this way a more accurate impression is gained of the general pattern of change over the whole country. See G. Ross, "North-west Durham," *Agriculture, Lond.*, **61** (1954/5) 507; N. E. Stroh, "The Raby Estates," *Agriculture, Lond.*, **62** (1955/6) 79; W. Harwood Long and J. D. Sykes, "Dairy farming in the West Riding," *Agriculture, Lond.*, **58** (1951/2) 163.

is true of south Cheshire [1] and the clay vales of Dorset.[2] Where larger farms with 100 acres or more of improved land predominate, a more mixed arable and grassland economy has generally become established.[3]

In counties of groups 1 and 2, areas of intensive arable farming occur, such as south Lancashire or the Mount's Bay district of Cornwall. These maintain their identity but show little tendency to expand into neighbouring areas.[4] Elsewhere advantage is taken of opportunities for specialized crop production. In Brecon and Radnor, for instance, high exposed farms grow seed potatoes and at lower levels oats and grasses are produced for seed.[5] Such activities add diversity locally but do not materially alter the dominant character of farming. Within the counties of the remaining groups (3, 4 and 5, Fig. 3) tillage has been intensified in the mixed farming areas, in the clay vales of the more easterly scarplands as, for example, in Lincolnshire, and in eastern Nottinghamshire and Huntingdonshire where much additional land on the heavier clay loams has been brought under the plough.[6] Furthermore, even southern Essex[7] and eastern Leicestershire, formerly such highly specialized grassland areas, produce a variety of crops for fodder and for sale off the farms. Many Leicestershire parishes which recorded in 1939 over 90 per cent. of the land under permanent grass, in 1951 returned an arable acreage of over 40 per cent., more than two-thirds of this under fodder and cash crops.

The distributions of individual cash crops are still generally related to the nature of the soils in the eastern lowland counties (groups 3, 4 and 5). Wheat tends to dominate on the heavy soils, barley on the lighter lands, sugar-beet and potatoes on free-working or loamy soils of the more easterly areas, and on these also much land is under vegetables for human consumption.[8] The prominence of individual crops varies from year to year in accordance with prices and market demands; and especially on the heavy lands, with weather conditions in the spring and autumn working seasons. A wet autumn increases acreages under spring-sown crops or, if bad weather interrupts work in both seasons, abnormally large acreages of bare fallow result. Counties of the third and fourth group are those characterized by the most marked extension of fodder and cash crop production. The greatest changes in land use are therefore associated with lowland areas of subdued relief where climatic conditions are akin to those of the pre-war arable areas of East Anglia, but where tillage was limited in the 1930's chiefly by the prevalence of intractable clay soils. These were both difficult and expensive to work; the more so with inadequate mechanization and methods of drainage.[9]

[1] Shaw, H. E., "South Cheshire," *Agriculture, Lond.*, **57** (1950/1) 586.

[2] See L. E. Tavener, "Changes in the agricultural geography of Dorset 1929–49," *Trans. Inst. Brit. Geogr.* (1952) 93–100. Also J. R. E. Rogers, "Sturminster Newton and Sherborne," *Agriculture, Lond.*, **60** (1953/4) 445.

[3] Graham, W. J., "Tweedside, Glendale and Belford, Northumberland," *Agriculture, Lond.*, **59** (1952/3) 292; R. W. Baker, "Abergavenny," *Agriculture, Lond.*, **59** (1952/3) 42; W. Harwood Long and J. D. Sykes, *op. cit.*; F. J. Bennison, "Warwickshire," *Agriculture, Lond.*, **60** (1953/4) 94.

[4] Craze, S. P., "Penzance," *Agriculture, Lond.*, **58** (1951/2) 139; J. A. Taylor, "Relations of crop distribution to drift pattern in south-west Lancashire," *Trans. Inst. Brit. Geogr.* (1952) 77–91.

[5] Adams, G. R., "Talgarth, Brecon," *Agriculture, Lond.*, **61** (1954/5) 456; S. L. Church, "South Radnor," *Agriculture, Lond.*, **60** (1953/4) 541.

[6] Wells, G. B., and A. Mann, "Kesteven and Lindsey," *Agriculture, Lond.*, **54** (1947/8) 135; J. S. Hopkins, "Nottinghamshire farming," *Agriculture, Lond.*, **62** (1955/6) 173; J. R. Keyworth, "Peterborough District," *Agriculture, Lond.*, **58** (1951/2) 198; F. Coles, "South Huntingdonshire," *Agriculture, Lond.*, **58** (1951/2) 243.

[7] Kitchen, A. W. Menzies, "Farming variations and soil types," *Agriculture, Lond.*, **58** (1951/2) 161; P. J. O. Trist, "Essex and Suffolk Clays," *Agriculture, Lond.*, **58** (1951/2) 176.

[8] Kitchen, A. W. Menzies; P. J. O. Trist; G. B. Wells and A. Mann, all *op. cit.*

[9] Keyworth, J. R., *op. cit.*; E. R. Bullen, "North Bedfordshire," *Agriculture, Lond.*, **59** (1952/3) 594; W. B. Mercer, "Agriculture in Birmingham and District," in 'Birmingham

CHANGES IN LAND USE AND STOCK OVER ENGLAND AND WALES 1939 TO 1951

Fig. 1 Percentage of Total Acreage under Permanent Grass, Grass and Fodder Crops, 1939 and 1951

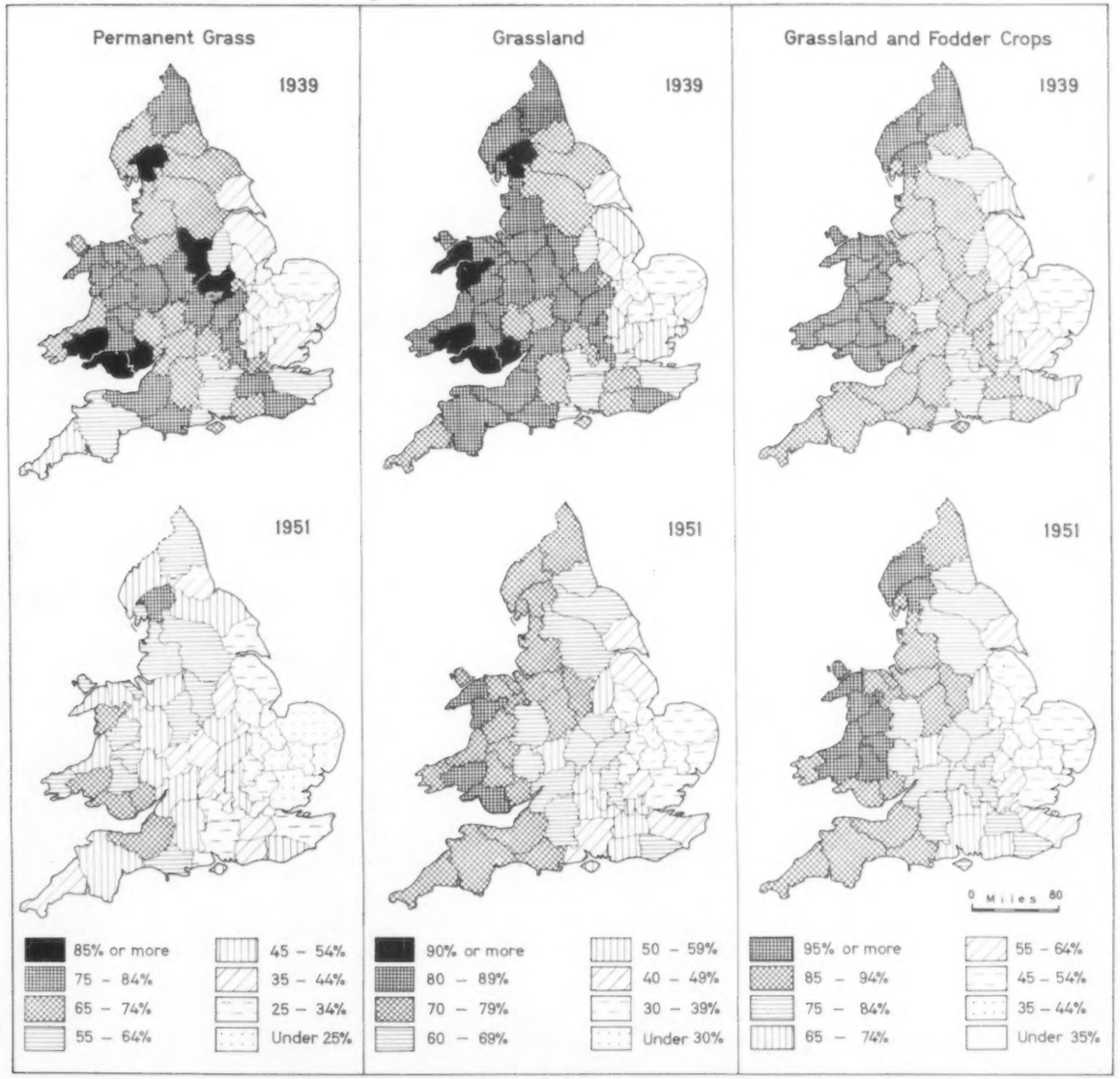

Fig. 2 Percentage of Total Acreage of Crops and Grass under Cash Crops, 1939, 1943 and 1951
Changes in Crop Acreage, 1939 to 1951

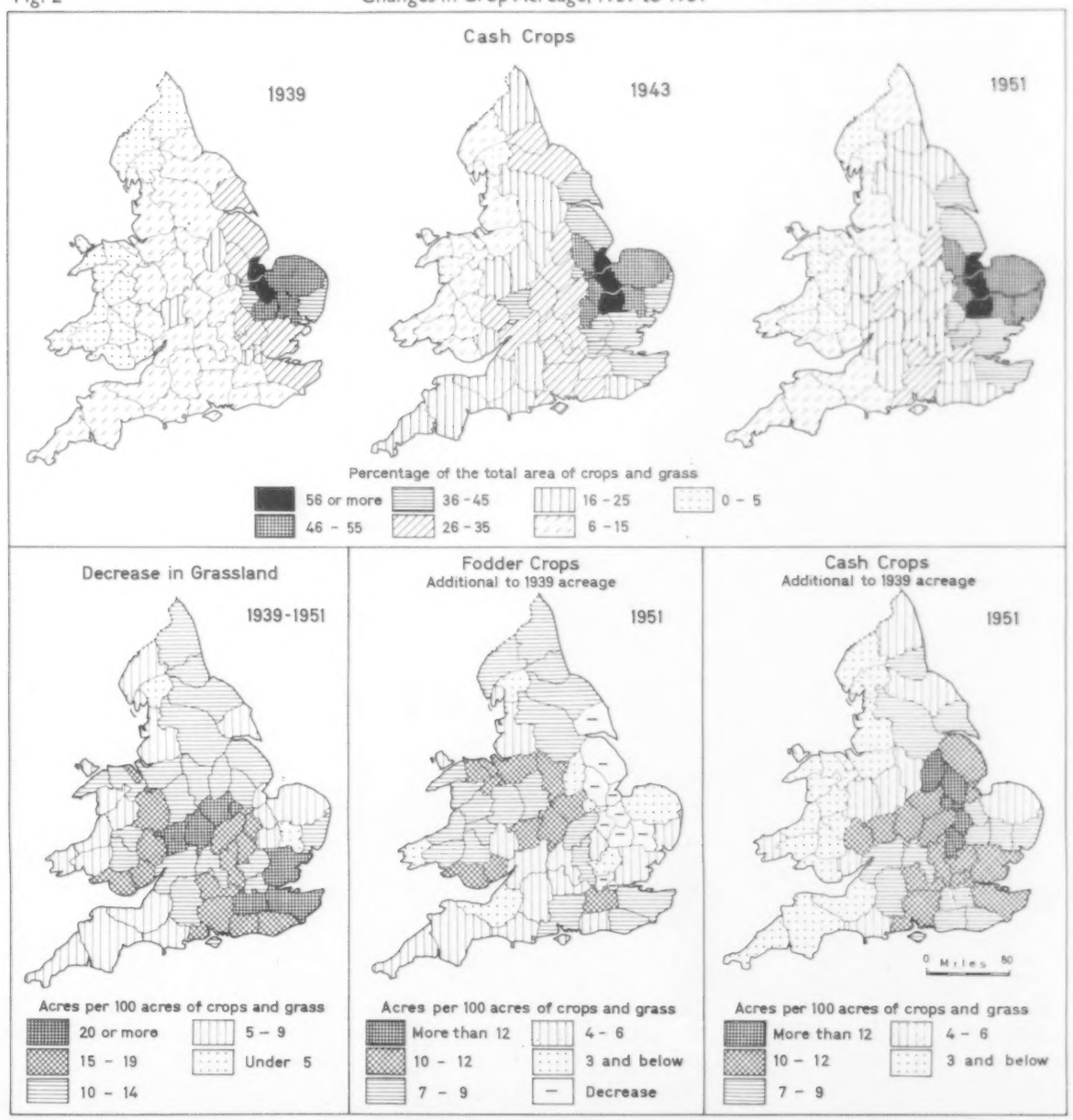

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Fig. 3 Changes in Land Use, 1939 to 1951

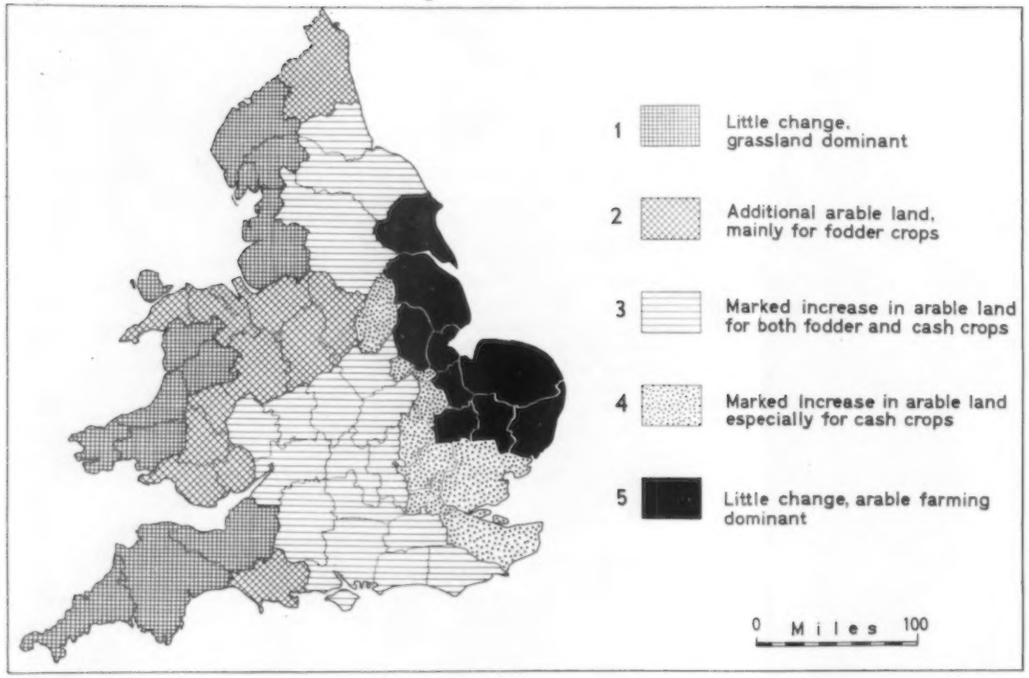
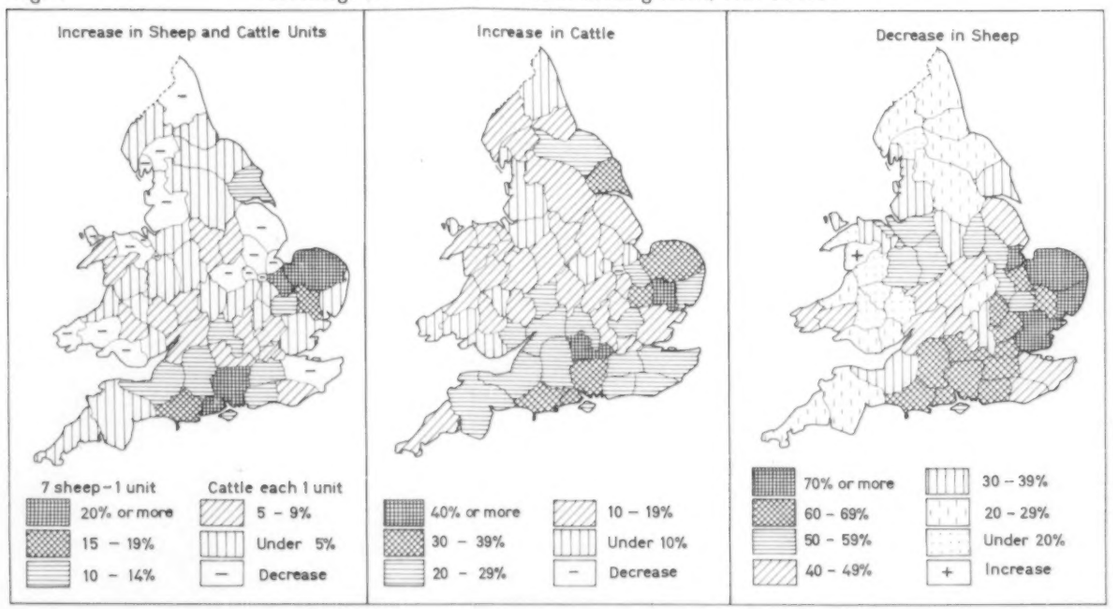
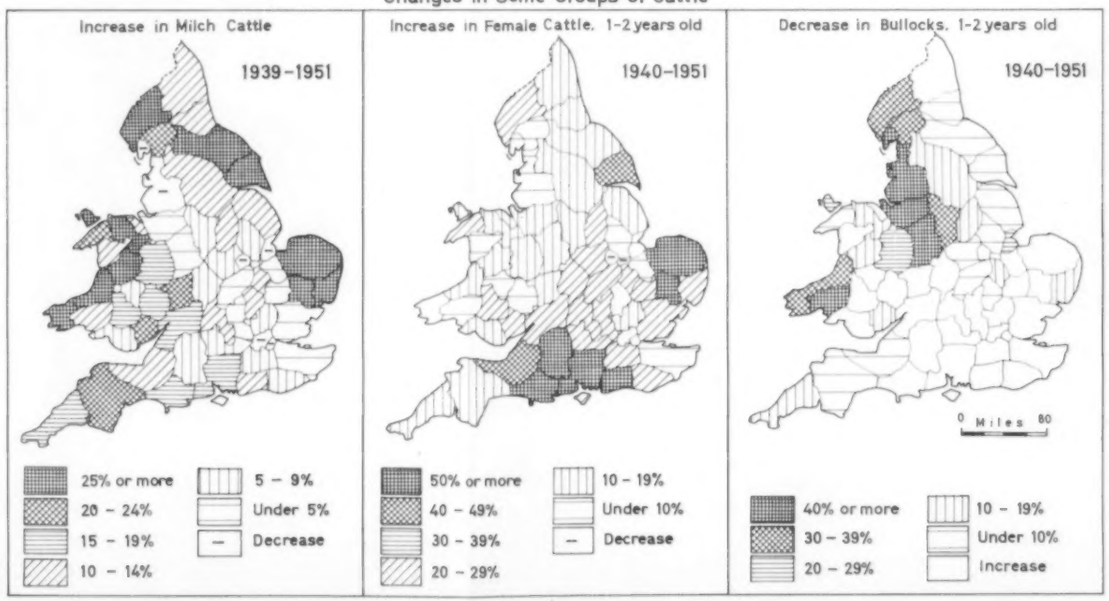

1 Little change, grassland dominant
2 Additional arable land, mainly for fodder crops
3 Marked increase in arable land for both fodder and cash crops
4 Marked increase in arable land especially for cash crops
5 Little change, arable farming dominant
0 Miles 100

Fig. 4 Percentage Increase or Decrease in Grazing Stock, 1939 to 1951



Changes in Some Groups of Cattle



Changes in stock farming.—Modifications in stock husbandry have likewise been widespread, but despite the reduction of grassland and the increased cash crop acreage, few counties showed a decrease in the total number of sheep and cattle units from 1939 to 1951. By 1953 Lancashire and Flint alone of the western counties returned totals below those for 1939,[1] though in the few easterly counties a further small decrease had taken place in conjunction with an extension of arable farming (Fig. 4). Sheep generally declined but in upland counties they largely maintained their position. In the lowlands, in contrast, their numbers fell sharply, especially in dairying counties and in those where large "arable" breeding flocks were formerly kept in connection with the Norfolk rotation,[2] as in East Anglia and in the Scarplands (Fig. 4). In Lincolnshire, for example, numbers were halved in many parishes of the Wolds and the Heath. Moreover grass sheep have tended to replace the "arable" Down breeds, though they are frequently crossed with Down rams for fat lamb production.

An increase in cattle has, in the majority of counties, more than compensated for the decline in sheep. Numbers have, however, risen only slightly in heavily stocked dairying areas; in Lancs, Cheshire and South Wales, for example, where improvement of stock is the main interest, and in such summer grazing areas as the Midlands where the beef stock are more directly dependent upon the grazing area available. In parishes of the Welland fattening district, numbers of cattle were in 1951 about one-third below those of 1939 if measured against the total farm area, but relative to the grazing area the density showed little change. A very decided increase in numbers is however apparent in northern East Anglia, Dorset, Hampshire and eastern Yorkshire where dairying has been expanding and cattle replacing sheep in farming practice (Fig. 4). Changes in numbers of different groups of cattle reveal general trends in farming economy. In the more specialized dairying counties an intensification of this activity, with particular regard to self-sufficiency for herd replacements, is evident. In many mixed stock counties in the Midlands and towards the east and south-east of the country the decided increase in female groups of "other" cattle and in milch cattle reflects similar tendencies where such facilities as water supply, milk collection and farm equipment permit.[3] Even from such remote western counties as Cumberland, Anglesey, Caernarvon, Denbigh, Cardigan and Pembroke there are reports of milk production doubled or trebled since the 1930's.[4] The composition of the herds in upland rearing areas has also been modified to meet market demands. More breeding and nurse cows are kept to increase output, though this may necessitate the earlier sale of store where the rigorous environment adds to the difficulties of obtaining sufficient winter feed for their maintenance.[5]

and its regional setting,' British Association Handbook, Birmingham, 1950, pp. 303–22; J. T. Coppock, "Land use changes in the Chilterns, 1931–51," *Trans. Brit. Inst. Geogr.* (1954) 113–40; H. C. Chew, "The post-war land use pattern of the former grasslands of eastern Leicestershire," *Geography*, **38** (1953) 286–95.

[1] Outbreaks of foot and mouth disease caused a temporary fall in cattle numbers in seriously affected areas during the summer of 1951.

[2] Trist, P. J. O.; G. B. Wells and A. Mann; J. S. Hopkins, all *op. cit.*

[3] Carter, W. R. B., "Truro," *Agriculture, Lond.*, **58** (1951/2) 247; D. H. Cameron, "South Oxford," *Agriculture, Lond.*, **60** (1953/4) 394; P. G. Swann, "Trowbridge and Devizes," *Agriculture, Lond.*, **58** (1951/2) 443; W. W. Gatenby, "Wold farming," *Agriculture, Lond.*, **58** (1951/2) 151; D. S. Hendrie, "The North Riding," *Agriculture, Lond.*, **58** (1951/2) 158; A. J. Langdon, "The Bradford Estate," *Agriculture, Lond.*, **61** (1954/5) 127.

[4] Lloyd, W. R., "Gwyrfai Caernavon," *Agriculture, Lond.*, **58** (1951/2) 344; F. W. Steele, "Wigton Cumberland," *Agriculture, Lond.*, **60** (1953/4) 244; D. T. Evans, "Hiraethog, Denbighshire," *Agriculture, Lond.*, **61** (1954/5) 606; G. M. Jones, "South Cardiganshire," *Agriculture, Lond.*, **58** (1951/2) 139; W. H. Jones, "Pembroke," *Agriculture, Lond.*, **59** (1952/3) 393; F. A. Barnes, "Dairying in Anglesey," *Trans. Inst. Brit. Geogr.* (1955) 137–55.

[5] Adams, G. R., *op. cit.*; D. R. Browning, "Clun forest farm," *Agriculture, Lond.*, **59** (1952/3) 538.

Unlike dairying, specialized beef production suffered a decline. In 1951 fewer young bullocks were recorded in western breeding and dairying counties and the same is true of the advanced store bullocks in Midland fattening counties. It is significant that beef production was not encouraged until the summer of 1951 after the target set for dairying expansion had been achieved. In subsequent years rather greater interest has been shown in beef production, frequently as an additional rather minor activity on a general or dairy farm. It would appear that stock have suffered least change in the most specialized arable areas such as the Fenlands, in the specialized dairying districts, and in the main mass of the uplands.[1] In general the modifications to stock husbandry, chiefly the expansion of dairying and the decline of arable sheep farming, tend to be a continuation of processes initiated prior to or early in the 1930's; unlike the changes in land use which are the direct outcome of the wartime farming of the 1940's.

Conclusion.—It is apparent that in all areas farming has been improved and intensified, the normal result of greater prosperity. In addition there is a decided tendency to maintain as diverse and flexible a farm economy as the limitations of the environment and farming facilities permit. This is shown by such features as the retention of cropping in former grasslands, and by a preference for grazing "by-product" sheep brought in from the hills (rather than keeping "arable" breeding flocks to which the cropping must be carefully adjusted) and for rearing heifers that may be drafted into dairy or breeding herds or fattened for beef (rather than "single-purpose" beef bullocks). Diversity and flexibility are especially advantageous under a system of planned economy such as that of the present and they facilitate the maintenance of economic stability. The emphasis can be more readily varied from one activity to another in response to market demands indicated by the annual price review and by special subsidies. The most specialized and intensive arable farming areas and the most intensive dairying districts, with their assured markets and reliable and regular returns, have shown little tendency to greater diversity and clearly there is little incentive. The less specialized areas dominated by arable farming in the 1930's have also shown relatively little modification in land use save more intensive production and some variation in cropping; but stock farming in such areas shows rather greater modification with the extension of dairying and the decline of arable sheep husbandry. In the upland areas, despite modern technical advances, the problems arising from both climate and relief still set severe limits to the type of farming which may be practised with profit even in this time of agricultural prosperity, and such areas exhibit a minimum of modification. The less severe limitations set in neighbouring lowlands have led to an intensification of the contrasts between farming in these two types of environment. Thus the division of the country on a geographical basis into upland and lowland zones is recalled and emphasized. Within the lowland zone, if areas of the type noted above are excepted, a well-marked response to post-war needs is apparent, especially in the Midlands and towards the east of the country, with regard both to land use and to stock farming.

[1] Many upland farms are benefiting from improvements carried out under the provisions of the Hill Farming and Livestock Rearing Acts. These tend to encourage the continued practice of the established type of hill farming, improved but otherwise little modified. (See W. D. Whitehouse, "The Shelve Estate," *Agriculture, Lond.*, **62** (1955/6) 35.)

NEW RAILWAY LINKS BETWEEN CHINA AND THE SOVIET UNION

VICTOR P. PETROV

UP TO A FEW years ago there was only one thin long steel rail running through Manchuria, which joined the Chinese railway network with that of the Trans-Siberian Railway. Thus to travel from Nanking or Peking to Moscow and further to western Europe, one had to take a train to Tientsin, then north to Mukden in Manchuria, along the Chinese Eastern Railway to Harbin, and on to the Siberian border town of Manchouli. From there one travelled along the long Trans-Siberian Railway, crossing Siberia to the Urals and Moscow. There was an immense territory to cross, and at least ten days had to be spent in a train. A single railroad link between the European part of Russia and the Far East was unsatisfactory to the Russians for many reasons, especially economic and military ones. From the strategic point of view, the situation was catastrophic, as the Russians learned only too well during the Russo-Japanese War of 1904–5, when the railway was not able to cope with the urgency of military traffic; this inadequacy of communications was one of the reasons for the Russian débacle.

During the Japanese occupation of Manchuria from 1931 onwards, the situation was even more serious. In case of war, a constant possibility, a bold thrust of Japanese armies could easily have cut the only link and so isolated the Russian Far East from its main bases in the west. This fact resulted in the feverish construction, with little regard for human or material wastages, of the controversial BAM trunkline (the Baykal–Amur Magistral) to the north of Lake Baykal. Up to now, it is not known whether the Soviet Union succeeded in completing this railway. There is not the same urgency in having it now in view of present Soviet friendship with China.

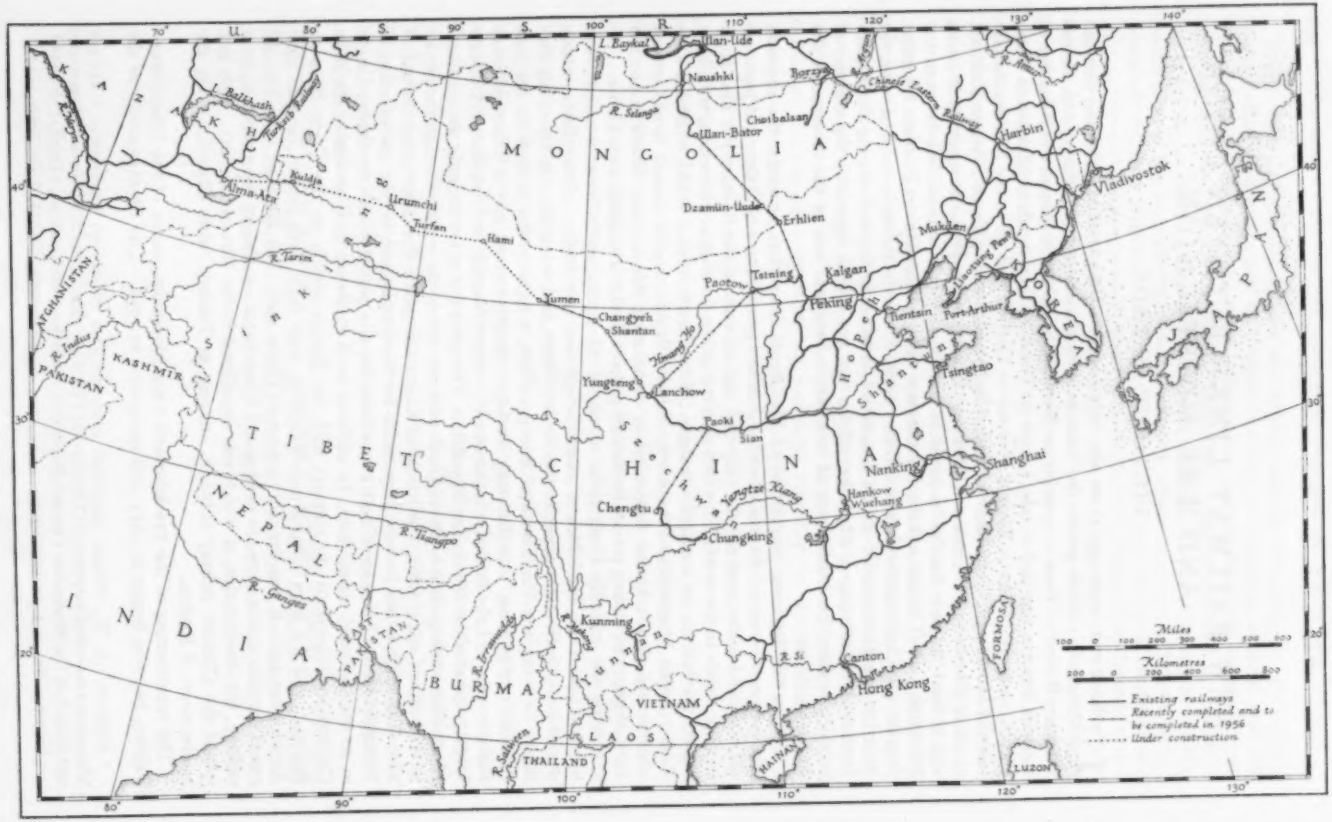
Having the friendly Communist states of Mongolia and China as neighbours brought about the bold idea of constructing two new major railway lines, which would bring both states closer to the Soviet Union, and would shorten travelling distances between the Far East and Europe. First, a railway was built from the east Siberian city of Ulan-Ude (formerly Verkhneudinsk), located on the Trans-Siberian Railway, east of Lake Baykal, via the border town of Naushki to Ulan-Bator (formerly Urga), capital of the Mongolian Republic.[1] This steel link at last brought the medieval Mongolian metropolis into closer touch with the rest of the world, through the Soviet Union. Since 1949, when the whole of China fell under the communist control of Mao Tse-tung, it has become imperative for Soviet planners to end the isolation of Mongolia from China, since both states have become partners with the Soviet Union in an international consortium. In addition to the railroad to Ulan-Bator, the lines Choibalsan–Solovyevsk, to connect with the Borzya station on the Trans-Siberian Railway, and the lines Ulan-Bator–Nalaykha, were built with Soviet Russian aid.[2] At the same time, it was decided to connect China with Ulan-Bator by rail. The old camel caravan routes between Peking and Ulan-Bator via Kalgan were replaced by a railway, the construction of which was completed in the autumn of 1955. This line joined the Chinese railway network, starting at Tsining, with Ulan-Bator via the border town of Erhlien.

The construction of the 710 kilometre long Mongolian sector of the Ulan-Bator–Tsining line was begun in 1953, and completed in 1955.[3] The Chinese sector of the

[1] Yakimov, A. T., 'Vtoroi piatiletnii plan razvitiya narodnogo khozyaistva i kultury Mongolskoi narodnoi respubliki' (The Second Five Year plan for the development of economy and culture of the Mongolian People's Republic), *Sovetskoe vostokovedenie*, **2** (1956) (Moscow).

[2] *Izvestia*, No. 163, 11 July 1954.

[3] *Pravda*, No. 38, 7 February 1955.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Wuchang
Chengtu
Yangtze Kiang
Chungking
R. Tsangpo
R. Ganges
Kunming
R. Si
Canton
Hong Kong
FORMOSA
LUZON
HAINAN
VIETNAM
LAOS
THAILAND
BURMA
INDIA
NEPAL
PAKISTAN
KASHMIR
AFGHANISTAN
R. Indus
R. Irrawaddy
R. Salween
Miles
Kilometres
Existing railways
Recently completed and to be completed in 1956
under construction

line between Tsining and Erhlien, which is 338 kilometres long, was completed in December 1954. With the completion of the whole line from Tsining to the Trans-Siberian Railway via Ulan-Bator, the travelling distance between Peking and Moscow was shortened by 1141 kilometres.[1] That the railway was constructed mostly by Soviet Russian effort and expense was openly stated by the Mongolian Prime Minister, who expressed his gratitude to the Soviet Government for its assistance in the construction of the line in Mongolia. This line from the Siberian border to the border of China is 1100 kilometres long.[2] Even though the construction of the line had been decided on as far back as 1952, it was only in 1954 that the joint communique of three states (Soviet Union, Communist China and Mongolia) declared that the Soviet Government and the Government of the Mongolian People's Republic jointly undertook the construction of a railway from Ulan-Bator to the Chinese border through the town of Dzamiin Uude. For its part, the Chinese Communist Government was to build a railway from Tsining through Erhlien to connect with the above-mentioned line at the Mongolian border.[3]

With the completion of this major trunk line, not only was the Soviet Union joined with Mongolia, but this new railway provided a second rail link with China as well, in addition to the original Chinese Eastern Railway in Manchuria. Furthermore, this line, as has been mentioned already, shortened the travelling distance between Russia and central China by more than 1000 kilometres. Inauguration of passenger and freight traffic along this "international" line was started on 1 January 1956. It is significant that the Chinese sector of the line from Tsining to Erhlien is of the same broad gauge as the Russian and Mongolian lines.[4]

Perhaps an even more vital link between China and the Soviet Union is now under construction in China. This is a long trunk line which will run through the remote region of Sinkiang to connect the city of Lanchow on the Chinese railway network with the Soviet Turksib Railway in Soviet Central Asia, in the vicinity of Alma-Ata, capital of the Kazakh S.S. Republic, and traffic will be inaugurated in 1960.[5] This new rail link, stretching through the most isolated and detached portion of China, will not only bring Sinkiang closer to China proper, but at the same time will bring China and the Soviet Union closer to each other. It will certainly be the shortest and least vulnerable rail link between these two countries; thus Russia and China will possess three railways which can become channels of closer cooperation, both economic and strategic. The construction of the new trunk line forges ahead steadily, and by the end of 1955 more than 400 kilometres of the railway were completed, reaching the city of Changyeh. In the course of 1956 the railway will have been extended further west to connect Lanchow with Yumen, the centre of rich oil deposits in China.[6] (For further information see page 477.)

The western world may look with certain misgivings at this closer link between the two giants of the Communist bloc, but it is not impossible that one of these two countries will one day reverse its stand towards its neighbour. In this connection it is interesting to consider the situation in Manchuria after the Russo-Japanese War, when Chinese immigration flooded into the empty lands by means of the new Russian railways, challenging Russian influence and finally thwarting the ambition of the Tsarist Government to control or even to acquire Manchuria. A similar situation might well arise in Sinkiang, a province which has hitherto been remote from China and dangerously close to Russia; quite often, Chinese officials appointed to Sinkiang have had to travel there through Russian Siberia on the Russian railways. The

[1] *Pravda*, No. 347, 13 December 1954; *Pravda*, No. 2, 2 January 1956.
[2] *Izvestia*, No. 90, 16 April 1955.
[3] *Novoye Vremia*, No. 42, 16 October 1954; *Pravda*, No. 285, 12 October 1954.
[4] *Pravda*, No. 293, 20 October 1955; *Pravda*, No. 2, 2 January 1956; *Izvestia*, No. 3, 4 January 1956.
[5] *Pravda*, No. 99, 8 April 1956.
[6] *Pravda*, No. 241, 29 August 1955.

isolation of this province from China, its proximity to Russia, and the fact that the Chinese were a minority there in relation to the Turki majority, all this held Sinkiang to China very loosely. In times of Chinese civil strife, in times of trouble, or when it was advantageous to the Russians, this province was not infrequently occupied by Russian troops both in the times of the Tsars and of the Bolsheviks, for preservation of peace, and protection of Russian economic and political interests. Only a trickle of Chinese could reach this province by tortuous camel routes (later by trucks), leading across deserts and high mountains. Sinkiang was even more remote from Peking than was Manchuria. Naturally, construction of a railway joining this province to the rest of China would be looked upon with certain misgivings by Russians, even in the special circumstances of the present time. With the completion of such a railway, Russian influence in Sinkiang Province must diminish and Chinese influence increase. An influx of Chinese immigrants is inevitable, which will flood Sinkiang as Manchuria was flooded soon after the Russians built the Chinese Eastern Railway there; should a strong China ever become antagonistic to Russia, Sinkiang would become a potential danger to the Soviet Union.

Perhaps a short excursion into the history of the last half-century or so would here be opportune, to illustrate the case of Sinkiang by that of Manchuria. Russia received the right to build a railway across the northern part of Manchuria, to connect with the Trans-Siberian Railway in the east and west, by the Russo-Chinese Treaty of 1896. Northern Manchuria was sparsely populated at the time, and the Chinese were in a minority in relation to local tribes of Manchus, Mongols and others. Thus the Russians built their railway, which is known as the Chinese Eastern Railway, through a virgin land of practically uninhabited country. In studying the geographical position of northern Manchuria, wedged between Russian territory on both sides, one would have expected that this thinly populated and remote province of China was about ready to fall into the Russian lap at a time when the Western Powers were practically dividing China into spheres of influence. The Russian-built railway brought Manchuria so close to Russia that it became, to all intents and purposes, a Russian colony. Such was the position when the Russian government of the day made a fatal step which, leading to the catastrophic events of the Russo-Japanese War, was eventually to eliminate Russian influence from Manchuria. In 1898 Russia acquired, by treaty, the warm water port of Port Arthur at the tip of the Liaotung Peninsula in southern Manchuria and, to connect the new port with the Chinese Eastern Railway, the South Manchurian line was constructed. It was at this point in time and place that Russia met the impact of budding Japanese imperialism which was seeking expansion in southern Manchuria, and the inevitable clash culminated in the Russo-Japanese war of 1904–5 which pushed the Russians back into northern Manchuria. But the railway remained, bringing Manchuria closer to China proper and joining the Russian-built line with the Chinese railway network.

A weak China, unable to oppose by force the designs of Russia and Japan on Manchuria, had a "secret weapon" in her extensive population. Gradually, China began to pour her hungry peasants from overcrowded Shantung and neighbouring provinces into Manchuria by the railway. This railway greatly simplified the problem of populating Manchuria, and Chinese hordes flooded this northern territory to the chagrin of the bewildered Russian administration. The Russian-built railway served as a funnel for the Chinese colonization of this outlying Chinese province—to an extent which can be gauged from the fact that the population of 8·1 million in 1891 increased to 15·8 million, or almost double, within sixteen years.[1]

The Russian Revolution of 1917 rang the death knell of Russian influence in Manchuria, when the Chinese warlord, Marshal Chang Tso-lin, expelled the Russian administration from the province. The transfer of administration into Chinese hands led to a stepping up of Chinese migration from the south to the fertile plains of north

[1] Anuchin, V. A., 'Geograficheskie ocherki Man'chzhurii' ('Geographical sketches of Manchuria'). Moscow: OGIZ, 1948.

Manchuria. During the one decade 1923–32, from 300,000 to 900,000 new colonist-farmers were arriving annually in North Manchuria from other parts of China.[1] This fact was recorded by the Lytton Commission which studied the problem and stated in its report to the League of Nations that: "While Russia and Japan were engaged in delimiting their respective spheres of interest in North and South Manchuria, Chinese farmers took possession of the soil, and Manchuria is now unalterably Chinese."[2] The same opinion was expressed by Henry L. Stimson, who said that: "While the Japanese people as a whole kept aloof, Chinese farmers have moved in and occupied the soil. The last thirty years have witnessed one of the greatest popular migrations of world history. Nearly thirty millions of people are said to have poured northeastward from the crowded Chinese provinces of Shantung and Hopei and have occupied Manchuria."[3]

This rapid increase in the population of Manchuria necessarily changed the face of the country. From being an almost uninhabited area at the time when the Russians originally came there, it became very populous within the incredibly short time of three decades. As a result of the Chinese colonization of Manchuria during the 1920's and of the natural population growth, the population of Manchuria started to increase rapidly.[4] By 1930 there were 31–32 million people in Manchuria. The Japanese census of 1940 shows 39·2 million, and according to data for 1945 there were 46 million inhabitants.[5] Thus in slightly over fifty years the population of Manchuria increased from 8 to 46 million. The province became completely Chinese, and all other national groups were thoroughly swallowed in this Chinese sea. This spelled the end of Russian ambitions, which were defeated, paradoxically enough, by the Russian-constructed railroad spur to the south.

The analogy with railway construction in Sinkiang is clear: Sinkiang, a remote province of China, hardly ever ruled by China, mostly governed by local warlords, separated from the rest of China by deserts and mountain ranges, and perilously close to Russia, will suddenly become attached to China by rail when the present line is completed. The new Chinese Communist government will undoubtedly flood this province with Chinese peasants, thus securing it against the possible insubordination or insurrection of local Turki and Moslem groups. Will the Russians, who are helping the Chinese in the construction of this railway, gain or lose politically and economically when the task is accomplished?

So long as China remains Communist, she will demand from the Soviet Union assistance in various forms—predominantly technical and military. However, if we remember the differences in Russian and Chinese character, and between the personalities of their leaders, the paths to Communism may eventually follow separate courses, and these two territorial giants may even become hostile to each other. In that case China with its 600 million people and with a railway leading right up to the underbelly of the Russian Soviet Empire could become an actual menace and a threat to the Soviet Union.

Suppose the social structure of the Soviet Union should change, still the fact of an increased Chinese population poised in Sinkiang on the Russian border, will mean only one thing: that any plan or thought of extending Russian influence in the direction of Sinkiang will have to be abandoned. Even now, Soviet leaders may well look with apprehension at the dangers to the Soviet areas in Central Asia arising from the new propinquity to Peking. Only one country is going to benefit from the completion of this new Sinkiang railway, and that country is China.

[1] Tretchikoff, Nikolai G., 'Sovremennaya Man'chzhuria v faktah i tsifrah' ('Contemporary Manchuria in facts and figures'). Shanghai, China Economic Press, 1936, p. 78.

[2] League of Nations: Lytton Report, 1932.

[3] Stimson, Henry L., 'The Far Eastern crisis,' New York, Harper, 1936, p. 18.

[4] Petrov, Victor P., "Manchuria as an objective of Russian foreign policy" (MS.) Doctoral Dissentation, 1954, p. 243.

[5] Anuchin, V. A., *op. cit.*, p. 46.

The productive possibilities of this remote province with its economic potential integrated into one overall, united system of Chinese economy will be expanded manifold. Sinkiang is rich in oil, coal and non-ferrous metals in addition to having possibilities for the expansion of agriculture and cattle-raising. Production of oil in the vicinity of Yumen is increasing just as is the production of coal in the Shantan and Yungteng area.[1] Chinese sources as well as Soviet publications on China indicate that the construction of another railway was started at the beginning of 1955. This railway is to connect Lanchow with Paotow in Inner Mongolia, a distance of 1100 kilometres. Thus Inner Mongolia will eventually be connected with north-western China, *i.e.* Sinkiang.[2] This connection is significant, since Paotow is becoming one of the very important metallurgical centres of China. Construction of the Paotow metallurgical works was started in 1953–54, and is expected to be completed at the end of the Second Five Year Plan, 1958–62, when it is calculated it will be producing over a million tons of metal annually.[3] The Paotow metallurgical works will be based on the local supply of iron ore and coal, in addition to refractory clay, the presence of which was established by extensive geological surveys.[4] With the completion of these major lines, Szechwan rice, salt, medicinal herbs, and non-ferrous metals will flow into the interior of China and to Inner Mongolia, while machinery and metals from Paotow and other metallurgical centres will flow to Sinkiang, to supply the newly-developed province with needed industrial products.[5] To integrate Sinkiang with the rest of China more fully, the construction of another important railway has been started to connect the great city of Chengtu in Szechwan with Paoki on the Sian–Lanchow–Sinkiang line. This line is to be completed by the end of 1956.[6] Chengtu is already connected by a railway with Chungking, from where the mighty Yangtze river becomes its outlet to the outside world. This additional link will tie Sinkiang to China even more securely. (For further information see page 477.)

The Yangtze river may also be reached from Sinkiang via Hankow–Wuchang, thus providing a direct route to Canton, the great southern metropolis. Formerly, cargoes had to be ferried across the wide river by boat, and quite often this caused terrible traffic jams. To allow a smooth flow of cargoes between north and south, the Communist Government of China started the hurried construction of a huge bridge (under Russian supervision) to span the Yangtze river at Wuchang. This bridge will be 1700 metres long, and 80 metres high, so that large ocean-going ships of 10,000-tonnage will be able to pass under it. The bridge will be of the two-decker type. The upper deck is designed for automobile and pedestrian traffic, and the lower deck for a double-track railway.[7] There are indications that the construction of the Yangtze river bridge has been accelerated. It is now predicted that in the autumn of 1957 this bridge will be completed much ahead of schedule. The Soviet Russian publications say that this double-deck bridge will become an important railway and highway link between northern and southern China, creating a new direct international trunk-line, Moscow–Ulan-Bator–Peking–Hanoi.[8]

Closely tied with the plans for linking central China with Sinkiang by railway will be the grandiose plan of harnessing the unruly Hwangho (Yellow) river. This younger sister of the Yangtze has been called in the past the "Sorrow of China." The Five Year Plan for the reconstruction of China calls for transforming the Yellow river into

[1] *Pravda*, No. 225, 13 August 1954.
[2] *Pravda*, No. 41, 10 February 1955.
[3] Astafiev, G. V., "Plan sotsialisticheskoi industrializatsii Kitaiskoi narodnoi respubliki" (Plan for Socialist Industrialization of the Chinese People's Republic), *Sovetskoe vostokvedenie*, No. 5, 1955.
[4] *Pravda*, No. 234, 22 August 1955.
[5] *Pravda*, No. 241, 29 August 1955.
[6] *Pravda*, No. 241, 29 August 1955.
[7] *Ogonyok*, No. 40, 2 October 1955, p. 3.
[8] *Novoye Vremia*, No. 36, 30 August 1956, p. 27.

a ladder or cascade of forty-six dams and reservoirs with attached hydro-electric power plants, with a total capacity of 23 million kilowatts and an annual output of 100 millard kwt-h., which is ten times the combined capacity of all the electric power plants of China in 1954[9]. The conquest of Yellow river, together with the bringing of that huge territory of Sinkiang nearer to China proper by rail, and a series of new industrial plants planned for the north-western territories, all these achievements would move China closer to Russia geographically. In one respect, China should become (at least temporarily) industrially dependent on the Soviet Union, since a great proportion of the new industrial plants and combines is supplied with machinery manufactured in Russia, and aided by numerous Russian engineers and technicians.

Addendum to page 473 (*received* 26 *November* 1956)

The joint commission of representatives of China and the Soviet Union, after a thorough survey of the terrain, decided that the junction of both Soviet and Chinese sectors of the railway should take place at the frontier, near Eby-Nur Lake. The two border stations, on either side of the frontier would have the same name "Druzhba" (Friendship). The Russian sector then will join the Turksib Railway at Aktogai station, to the north of Alma-Ata (*Pravda*, No. 173, 21 June 1956). This new trunk line is supposed to facilitate export of Chinese Turkestan raw materials to the Soviet Union, and, in return, this Chinese province will receive from Russia: copper ore from Dzhezkazgan and Kounrad, Karaganda coal, and Altai non-ferrous minerals. The route of the projected railway has been carefully surveyed, and its Russian sector will follow a line south of lakes Sasyk-Kul and Ala-Kul. By 1960 the whole railway in China and Russia, including the Soviet sector which is 308 kilometres long, will be completed and in operation. For this purpose it will have been necessary to remove over 6 million cubic meters of earth (*Izvestia*, No. 177, 26 July 1956).

Addendum to page 476 (*received* 26 *November* 1956)

Additional reports on the progress of the Paoki-Chengtu line indicate that this 668-kilometre railway has been completed one year sooner than expected and planned. It passes through mountainous country, where it was necessary to build 286 tunnels and 961 bridges. The total overall length of all tunnels is 81 kilometres (*Pravda*, No. 286, 12 October 1956).

9 Efimov, G., "Narod-Ispolin" (People-Giants); *Novoye Vremia*, No. 40, 29 September 1955; *Ogonyok*, No. 40, 2 October 1955; *Izvestia*, No. 287, 4 December 1955; *Pravda*, No. 234, 22 August 1955.

HÖHNEL ISLAND (SOUTH ISLAND) IN LAKE RUDOLF

JOY ADAMSON

THE ISLAND is about 10 miles long by about 3 miles wide and lies in the southern portion of Lake Rudolf, which is a sheet of brackish water some 180 miles long by about 15 miles wide, situated in the northern deserts of Kenya. Lying in the trough of the great Rift Valley it is a highly arid and volcanic region beset by the most violent gales, often reaching a velocity of 100 miles per hour. Owing to the lake's remoteness and the dangers of navigation on its turbulent waters, few attempts have been made to explore the island. In 1934 a scientific expedition called the "Lake Rudolf Rift Valley Expedition," led by V. E. Fuchs, arranged to visit the island. Messrs. Fuchs, Dyson and Martin made the crossing and Mr. Fuchs returned after a brief stay, but the two others were never heard of again. This tragedy, and native superstition, have clothed the island in a veil of sinister mystery.[1]

My husband is Senior Game Ranger of the Northern Province and for more than twenty years it had been his ambition to visit this forbidding island; in fact, ever since his first safari to the region in 1934, shortly before the ill-fated Fuchs' Expedition came to grief. Since then he has done a number of safaris on foot and by car to the lake, and always come away more determined than ever to go there. Not until the present occasion had he had the means of realizing his ambition. Circumstances so ordered events that he found himself in possession of a 14-foot flat bottomed wooden dinghy and two outboard motors, upon the eastern shores of Lake Rudolf and it was too great a temptation to resist.

I arrived at my husband's camp at Loingalane on the east shore of the lake on 24 July 1955. It was a lovely camp set in a grove of Dom palms beside a spring of clear sweet water, an oasis in the midst of a desolation of barren lava and sand. We planned to make the crossing the following day, and G. arranged with his Game Scouts about signals. On the evening of our arrival on the island, he would fire off a Verey light which was to be answered by our driver who would have the Land Rover on a ridge overlooking the lake, and switch the lights on and off three times. On subsequent evenings the same signals would be repeated and would mean that all was well. The distress signal was to be three Verey lights, seeing which the driver was to hurry to North Horr, a desert police outpost some 50 miles to the north equipped with radio, and signal Marsabit, the main headquarters of the district another 130 miles to the east, for help. He impressed on the men that on no account did he want any fuss made or alarm created while they saw the single Verey light even if we were away for a week or more, as the weather might well hold us up. I did not ask G. what was to be done if no Verey lights were seen! The men were very upset and uneasy about the whole project, as the El Molo, a primitive fishing tribe, had told them tales about a fearsome demon on the island, and maintained that anyone going there would never come back. The demon, in the guise of a beautiful goat, would entice people into a crater at the top of the island where they would be swallowed up. Nevertheless, two of the game scouts volunteered to come with us. However, there was no question of taking them as there was no room in the boat.

The 25th was not favourable: there was a high wind all day and "white horses" on the water. The 26th looked even worse, but by noon the wind suddenly changed and set from the west—a sure sign that a calm would follow. We hurried to our starting point, a small bay 6 miles to the south of our camp, and got the boat ready. We

[1] Papers by Dr. Fuchs on the expedition appear in *Geogr. J.* **86** (1935) 114–42; *Phil. Trans. B.* **229** (1939) 217–74; *J. R. anthrop. Inst.*, **67** (1937) 327–38.

lashed down three inflated motor car inner tubes and empty petrol cans for buoyancy. Forward we stowed two steel boxes containing our food, cameras, Verey lights, ammunition, etc. We installed the larger of the two engines and stowed the smaller in case of emergency. The larger of the two motors was of 4 horse power, rather too heavy for the dinghy, and it left us with only 2 inches of freeboard, but it was fast and G. estimated it would take us across in under the hour. Also we took two rifles, a ·22 and a ·303. By 4.30 p.m., the "white horses" having gone to bed, we set off. The motor behaved beautifully and in an hour and a quarter we landed in a little cove on a gently sloping sandy beach.

The water was crystal clear and we could see huge perch and *tilapia* cruising about. We unpacked our gear and drew the dinghy up the beach and set off to look over our surroundings. Much to our dismay we found that we had landed on a little satellite island cut off from the main island by a 50-yard channel. We have since learnt from Dr. Fuchs that this island was named by him "Martin Island" and so described in his Royal Society paper. It was there that they measured their survey base line in 1934. The shore looked extremely uninviting, jagged lava running straight down to the water, with only one little beach where a landing would be possible, and on the beach we could see an enormous crocodile fully 18 feet in length. We hurried to the boat, packed up again and made for the beach across a half mile of water. It consisted of 30 yards of sand and shingle between two lava flows well sheltered by a headland. There was not much time before the light went, so we busied ourselves making camp. First of all we were anxious to find a resting place secure from crocodiles and possibly other animals, as G. thought that whatever wild life might exist on the island would have neither knowledge or fear of humans. We made our bed in a cleft of a rock about 20 yards above the shore. I say beds! G. had a single cotton *kikoi* and myself a single blanket with loose pebbles for a mattress. By dark we were more or less settled in. Soon we saw the headlights of the Land Rover far across the lake. G. sent up a Verey light which was promptly answered as arranged, followed by a firework display of ·303 tracer bullets. Evidently the men were pleased to know that we had arrived safely. About 9 p.m. the prevailing east wind started up and increased in violence through the night until it was a howling gale, sweeping down in cold tearing gusts. Sleep was impossible and long before dawn we were shivering with cold. It was a relief to get up and boil some tea to warm our bones. The lake was exceedingly rough and stormy, great waves dashing up against the lava, sending spray 20 feet in the air. Again I noticed the Land Rover lights across the water. The faithful Ibrahim wanted to make sure that the demons had not eaten us during the night.

After breakfast, we started up a lava flow to climb to the top of the backbone range of hills which reach a height of about 1500 feet above lake level. The going was exceedingly bad and even dangerous; a false step and fall might result in a nasty injury on the knife-sharp lava which had cooled into fantastically broken and tortured shapes. There were enormous lava blisters caused by steam or gases, with egg-shell thin crusts, into which one might fall. Near the summit the going became easier over a layer of fine cinder. In a little valley, we came on a flock of seven goats; they let us approach to within 40 yards and then made off. In appearance they were no different from any flock of native goats. They were in excellent condition and altogether more agile and healthy looking than the average native goat. From the top of the central peak, we got an extensive view of nearly the whole of the island. A more forlorn and desolate landscape it would be difficult to imagine, except perhaps on the moon. The whole of the eastern side of the island is a mass of lava flows with scarcely a break, running down to the water, offering few possible landing places, exposed to the full force of the gales. The western side, on the other hand, consists of gently sloping stretches of volcanic tuff, smooth to walk upon and giving excellent sheltered landing places—an altogether more hospitable shore than the east. There is a certain amount of vegetation in the craters and the intervening valleys, a few scraggly acacia trees, Sterculias and frankincense bushes and sparse tufts of a coarse spiky grass upon

which the goats feed. But for the most part the island is bare of vegetation. Through glasses, we saw four more flocks of goats numbering about sixty animals. Most of the craters are surmounted at their highest points by stone cairns, presumably built by Dyson and Martin in the course of their survey work. We also built a cairn and I collected specimens of the vegetation. By 4.30 p.m. we were back at camp and spent the remainder of the afternoon in trying to render our camp less uncomfortable. We built a stone wall across one end of the cleft to act as wind break, collected drift wood for fuel and removed the larger and sharp pebbles from our couches. Soon after sundown we again exchanged signals with the shore.

On the 28th, after another gale-ridden and comfortless night, we set off southwards along the shore, with the idea of trying to find some traces of Dyson and Martin's camp, with the hope that it might give us some clue as to what befell them. The going was even worse than the previous day, as we had to cross numerous lava flows instead of keeping along them. There is a well-marked water line some 40 to 50 feet above the present lake level. Evidently no eruptions have taken place since the water receded from this level. At one point between two lava flows I noticed what must have been the lake level prior to the eruptions, at least another hundred feet higher up. On our way south we passed two little lagoons swarming with crocodiles of every size; they appeared to be almost as shy as on the mainland. Among them, were shoals of *tilapia* apparently quite unconcerned. Close by was a small flock of goats; they allowed me to approach to within 30 yards and to take photographs. We continued along the shore, and found only two small beaches where a landing might have been possible, but no signs of any camp. From the top of a ridge we could see the coastline stretching to the south in unbroken lava flows. Jagged half-submerged rocks could be seen well out from the shore, very dangerous to navigation. Everywhere were the sloughed-off skins of snakes; two species were seen, the striped sand snake and the spitting cobra. These evidently feed on lizards of which there are many. Two more small flocks of goats were encountered, feeding on *caperis* bushes and the spiky grass.

On the 29th, after another stormy night, being footsore and our shoes in tatters, we decided to have a rest, and stay around camp, mend shoes, collect firewood, etc. Driftwood was by no means plentiful and we had to go a long way to find it. On one of our trips we came on fragments of pottery; these lay along what might have been a rough path across the lava, just above the highest water line some 40 to 50 feet above the present level. Later we found more fragments in a similar position. It proved that at some period the island was inhabited. We also came on a rough stone wall about 18 inches high and 3 feet long beside the same rough path. There seemed no purpose for the wall; it might have been put there to mark the path, or perhaps was built by children at play. We found no other indications of habitation such as fireplaces; but anyone living on the island would certainly not choose the exposed eastern side for his home. I think a careful search of the western side of the island would almost certainly reveal traces of the former inhabitants, and indeed we heard later that Dr. Fuchs found pottery and human remains on the west side of the island.

My husband shot two *tilapia* of about 6 lbs. weight with the ·303. In fact, provided the lake was not too rough, there was no difficulty in obtaining fish in this manner whenever required. They were delicious eating—probably the *tilapia* is one of the best eating fish in the world. While wandering about the camp, I suddenly saw the neck of an empty whisky bottle sticking out of a heap of stones; further investigation revealed some old rusty bully beef and sardine tins. We had found Dyson and Martin's camp, within 10 yards of our own. Evidently they were tidy-minded people and had buried the camp litter. This find would suggest that they had packed up camp and left for the mainland and had met with disaster on the way.

On the 30th, having mended our shoes, we set off for the northern end of the island. We toiled along for three hours over very rough lava until we reached a wide bay with a pebbly beach. On a high-water mark about 12 feet above the present

level, we found, among other debris, a 4-gallon steel petrol drum, corroded with rust and beside it a length of red motor car inner tube. Both these objects were obviously very old, the former being of a type well known before the war. In old records of the inquest on Dyson and Martin, it is mentioned that they had 4-gallon petrol drums in their boat. At this point the island becomes a peninsula. The bay already described has a corresponding bay on the west, divided by a ridge about half a mile across. There is an isolated lava flow which comes down the east side of the ridge. Beyond are two extinct volcanoes composed of fairly smooth tuff, dropping at a steep incline into the lake, forming the northern end of the island. At the foot of this incline, we saw an astonishing sight: thousands of big *tilapia* were lined along the water's edge, often with their backs above the water, hungrily gnawing away at a thick pink slippery deposit which covers the rocks. Further out there were big shoals of *tilapa* like dark clouds, containing hundreds of fish packed close together. As we watched, the shoals would break up and the fish start feeding on the rocks again. I have never seen so many fish in my life. I noticed the same phenomena all along the coast, but not so concentrated. Perch and other fish of which there were plenty seemed to take no interest in the pink food. On one occasion G. shot a *tilapia* and the bullet stunned some small fish. Among these was a little chap deep carmine red with blue spots on its head, about 1½ inch in length. By the time we reached the northern end of the island, the lake had calmed down considerably and had we been back at camp we might have been tempted to assay the crossing. We hurried back to camp, but by the time we reached it, "white horses" had again appeared on the water. In fact, it was fortunate we had not stayed in camp. This was the first day since our arrival that the lake had been fairly calm.

August 31 and September 1 were spent around camp; our shoes were about finished, food was running low, and we were becoming anxious about getting back, and did not wish to miss any opportunity the weather might give us. Our signalling arrangements with the shore had worked perfectly. Punctually every evening, the car lights had appeared and we had replied with a single Verey light. We could have carried on thus without any great hardship for a week or more, by living on fish and shooting a goat for the sake of its fat—perhaps even crocodile eggs for breakfast! I noticed all along the shore wherever there was sand the crocodiles had dug holes for their eggs. Most probably the crocodiles come from the mainland to breed on the island safe from the attentions of the El Molo and Turkana tribesmen who hunt and eat them. It would account for their shyness. The morning of the 2nd did not look at all promising, a strong wind was blowing, and a heavy sea running. We almost made up our minds to leave camp and to cross over to the western side of the island to explore it. However, soon after noon the wind changed and started to blow from the west and G. felt certain there would be a calm late in the afternoon. Sure enough, by 4 p.m. we judged the lake sufficiently calm to attempt the crossing. We packed up and set off, but on rounding the little island, found the sea still too rough to be safe. We returned to our beach, rather despondent. However, an hour later the conditions had improved considerably and we again set off, making the crossing without trouble in just under the hour. There was one bad moment when the motor suddenly gave out when still 2 miles from shore, but it had only run out of petrol and G. soon managed to get it going again. Two of our men were waiting for us on the shore and were wild with delight to see us again. I asked them how they knew we would return today; they said that a Rendille girl, famous for her second sight, had said we would come; so they had walked from our camp in the morning to wait for us. At sundown the car arrived to carry out the routine signals. We got a great welcome on our return to camp, both from our men and the Rendille and El Molo. The chief of the El Molo was full of questions and much interested in the story about the goats and the vast numbers of fish, and is now resolved to go there with his people and make the island their home, particularly as we had proved that there were no demons on the island, or at any rate no bad ones.

Thus ended a very interesting trip to this legendary island. In spite of its barrenness there is an attraction about it, difficult to define, which makes us firmly resolved to visit it again some day. Next time, I hope, in a more seaworthy craft and in the company of knowledgeable people who can make the trip of value to science. Apart from the goats, which must number well over two hundred, and two species of bats, the island contains no mammals whatever, not even rats. This fact doubtless accounts for the prevalence of snakes, which have no enemies apart from birds. It is certainly the most snaky place I have ever been in. On the morning of our return, G. found a young spitting cobra in my bed. He omitted to mention the matter until we had arrived safely back at camp. The El Molo and Samburu tribes have a legend, that a long time ago, the southern portion of the lake was dry land and that people used to live there. One day a young pregnant woman was herding her goats and came on a spring bubbling out of the ground. Having nothing better to do, she idly picked up a stone and started to hammer away at the orifice of the spring; suddenly, it burst open and a great gush of water shot out flooding the land. The young woman fled with her goats to the hills, which soon became an island; there she in due course gave birth to twins and thus the island was peopled.

THE PROFILES OF GLACIAL DRAINAGE CHANNELS

R. F. PEEL

In his short paper in the March 1956 issue of the *Journal* C. R. Twidale [1] has recorded examples from north Lincolnshire of glacial drainage channels revealing the same peculiarity of an upward convexity in their longitudinal profiles as the Northumbrian channels I described in 1949,[2] and has offered suggestions as to how this anomalous feature might have originated. In my earlier paper, to which Twidale refers, I was concerned more to draw attention to the existence of the peculiarity, and to the problems it appeared to raise, than to explain it, for the extent of my investigation did not seem to justify serious theorizing. While, therefore, I mentioned various ways in which such channels might conceivably have acquired profiles upwardly convex, and gave reasons why some of these seemed more improbable than others when applied to the Northumbrian cases, I suggested that more fruitful than premature speculation would be a wide examination of other channels of the same general type to ascertain whether the peculiarity was, or was not, of common occurrence. If it was found to be widespread then, I suggested, we should have to consider seriously how it could be explained, and whether the standard theory attributing such channels to single-phase erosion by the direct overflow waters from temporary ice-dammed lakes might not require some modification.

Since I wrote, few studies of the type I had in mind seem to have been made, and perhaps it is even yet premature to claim that the widespread existence of "up-and-down" channels, if I may so describe them, has been satisfactorily demonstrated. Observation would, indeed, suggest that a large number of the channels attributed to glacial meltwater drainage in northern England have up-and-down long profiles on their present floors, but thick peat growth on the "hump" has often to be allowed for, together, in some instances, with some accumulation of slope-wash from the sides, so that only elaborate programmes of boring could establish with certainty the forms of the original erosional profiles. Even when allowance has been made for these factors, however, I consider from field observation that quite a number of channels, in northern England at least, probably do possess true up-and-down profiles in some degree, including some of those in the North York Moors that Kendall first described. In his various writings Kendall makes it clear that he had himself observed the peculiarity, and in the case of two channels where it is strongly marked he proposed a specific explanation in terms of reversal of water-flow.[3] To support my own opinion, it may be recorded that although few have so far published their findings quite a number of more recent workers have in fact observed and confirmed humped profiles in various areas. Thus D. H. Maling has recorded them in considerable number in Weardale [4]; J. B. Sissons has told me in correspondence that they are common in the Lammermuirs where he has been working; R. Common has similarly recorded them around the Cheviots; and M. M. Sweeting has told me of their existence in Ireland. With Twidale's observations we now have confirmed examples from Lincolnshire

[1] Twidale, C. R., "Longitudinal profiles of some glacial overflow channels," *Geogr. J.* **122** (1956) 88–92.

[2] Peel, R. F., "A study of two Northumbrian spillways," *Trans. Inst. Brit. Geogr.* **15**, 1949 (1951) 73–89.

[3] Kendall, P. F., "Supplementary Observations on the Glacier Lakes of Cleveland," *Proc. Yorks. Geol. (polyt.) Soc.* **15** (1903) 40–45.

[4] Maling, D. H., "The geomorphology of the Wear Valley." Ph.D. Thesis, University of Durham, 1955 (unpublished).

(although the degree of upward convexity is here in most cases slight), and although the many reported instances no doubt vary greatly in details, circumstances, and perhaps modes of origin it would seem that we have at least sufficient data to justify further investigation and the discussion of possible explanations.

From a number of conceivable explanations, I mentioned in 1949 four, of which three seem worthy of serious consideration, namely:

(i) That the anomalous "up-slope" element leading from the site of the presumed former lake might represent a secondary and later addition to the true overflow carved by a modern stream leading back from the true overflow intake towards the former lake bed;

(ii) That the anomalous profile might, in certain circumstances, have been developed by a reversal in direction of the lake-overflow drainage through the channel occasioned by draining away of the original lake and the creation of a new lake on the former outfall side by changes in ice-front positions (a mechanism similar to that suggested by Kendall for two channels near Scarborough);

(iii) That these anomalous channels might not have been excavated by free-flowing lake overspill waters at all, but cut in part at least by sub-glacial meltwater streams working under sufficient hydrostatic head to permit limited uphill erosion.

To this list Twidale has now added two further suggestions. The first, like my first, invokes a compound origin for these anomalous channels in the end-to-end linkage of a true overflow with a normal stream valley, with the difference that he considers the stream valley to have existed prior to the cutting of the overflow rather than as being a subsequent development. His second is, in effect, the same as my own, but uses a different set of controlling circumstances to produce the reversal of flow.

The second of his suggestions Twidale advances in general terms, and not as an explanation of any observed examples. In principle it would appear mechanically capable of producing the required result, although as a general explanation for "humped" channels it suffers from the same disadvantage as my own, namely that it requires special conditions unlikely often to be fulfilled. Examined in more detail, however, the mechanism as set out in the author's Figure 4 (p. 90) and the accompanying text is less satisfactory. The original channel WYZ, to terminate at point Z, would require a pre-existing lake in valley B at level 2 (as is indeed specified in the text), but for such a low-level lake to have been maintained in conditions of rapid feeding by meltwaters would necessitate an outlet from valley B at level 2. How then could the lake in Valley B later rise up to level 3? To permit this, complete blockage of the low-level outlet would seem necessary, and only ice could effect this; but no mention of such a blockage is made, and the case is advanced on the grounds that it does not involve ice-front changes. Moreover, if we accept a progressive rise in the level of Lake B as the overspill from Lake A pours into it, how is the channel WYZ cut so deeply, and right down to the original 2 level? The lower parts would be progressively drowned as the surface of Lake B rose, so that the channel profile in any case could hardly be concave; and if the rise in Lake B were rapid, it is difficult to see how a deep channel like WYZ could be cut at all, for to accomplish this a lengthy period of still-stand in Lake B at level 2 would be required after the overspill from Lake A had started—a condition which contradicts the developments postulated. It will be noted that the elimination of any original low-level outlet from Lake B is equally necessary to permit the later parts of the evolution to proceed.

These criticisms are advanced in no carping spirit but to underline the difficulties and complications attending any attempt to reconstruct in detail and in three dimensions conditions which would produce a total reversal of flow through a ridge-top channel in order to develop in its floor a compound humped profile of the type under discussion. I did not make the attempt in the case of the two Northumbrian channels, despite being driven towards this kind of explanation by my inability to accept any alternative that I could conceive; but if it were attempted, whether by moving ice-

fronts about, or on the lines suggested by Twidale, I am somewhat doubtful if the result would be acceptable either in inherent probability or in its repercussions on established evidence relating to late glacial events.

Twidale's first suggestion, which he believes to afford the correct explanation of the four Lincolnshire examples he records, would seem to be inherently more probable and to be supported by his field evidence. Assuming that these dry channels cut across watersheds were formed by lake overflows, it would seem likely that in many cases the col over which the water escaped would lie at the head of a pre-existing stream channel leading back towards the valley in which the lake was impounded, and as the intake of the overflow cut down it might well in many cases merge cleanly into the "throat" of the drowned stream valley so that on final draining of the lake a composite channel would be left notching the ridge. In such a case we should expect the two oppositely inclined sections of the channel to display very different features, the former stream-channel having the shallow-V cross-section, the sinuous alignment, and the downhill-pointing tributaries of a normal stream valley, and the continuation through the watershed and down the other side the "railway-cutting" features we associate with the true overflow. Although he does not describe the evidence in detail (a fuller description is apparently to appear elsewhere), Twidale indicates that such contrasts were indeed observable in his examples (p. 90), and this would seem to justify his interpretation. This kind of explanation, however, as Twidale admits, is scarcely acceptable for the Beldon and Dipton channels in Northumberland, for there the "railway-cutting" characteristics are continuous throughout the whole lengths of each channel in both up-slope and downslope sections, as is the case in other comparable channels that I have observed. A further difficulty, too, intervenes to render Twidale's explanation unsatisfactory for some, at least, of the northern up-and-down channels, which is that the areas in which they lie had been subjected to heavy glaciation prior to the channel-cutting period and that any pre-existing stream channels would have been filled in with drift. This is the situation at, for instance, the Dipton channel where the up-slope intake end is partly excavated into the thick drift which swathes the floor and flanks of the Devil's Water valley in which the presumed parent lake was impounded. The wider application of this type of argument raises, of course, the vexed question of just when the presumed lakes existed in relation to the phases of glacial history, and on this point it is perhaps worth while making reference here to evidence which has come to light in recent years in County Durham but which, through lack of publication, is not yet widely known.

In north-east England the existence of extensive river-channels now completely buried under the drift-sheets which blanket the lower ground has been known for many years from mine-borings. Our knowledge of the extent and linkages of these features has been greatly amplified in recent years by the vast number of new borings put down by the National Coal Board and the Opencast Executive, but these borings have also revealed unsuspected complications in some surface "overflow channels," and indicated that further similar channels may also be completely buried and without surface expression. D. H. Maling has worked exhaustively on the evidence available in middle and lower Weardale and I have his permission to refer to descriptions in his unpublished Ph.D. thesis. W. Anderson of the Geological Survey also described some of these buried channels in his (unpublished) Presidential Address to the Yorkshire Geological Society in 1954. Lengthy description would be out of place here, but the following important facts appear to emerge. First many glacial drainage channels that have surface expression and have been known and interpreted for many years must have had much longer and more complicated histories than was earlier supposed, for they have been found to contain deep floorings in part of fluvio-glacial sand and gravel but in large part of undoubted boulder-clay. The great Ferryhill channel is of this order, borings having revealed elements of an earlier phase of the channel now filled in with nearly 200 feet of boulder-clay. Secondly some of the buried channels with no surface expression possess alignments and forms which suggest that they too

were cut by abnormal ice-melt drainage and subsequently filled in. The Burnopfield channel, mentioned briefly by Anderson in 1940,[1] would seem to be of this type. Thirdly, in the case of one or two partly filled-in channels sufficient borings exist to allow a rough-and-ready reconstruction of the long profile of the deeply-buried rock floor, and in one case at least there is a suggestion of a "humped" profile in the solid rock floor, together with the possibility of a closed depression in this floor at the highest part of its profile strikingly reminiscent of the similar depression suggested in the Beldon channel floor by my own 1948 borings. And fourthly, in quite a number of channels the present markedly "humped" surface long profile has been shown to be carved essentially in the boulder-clay infill of an earlier stage of the channel.

The information is inevitably patchy, and interpretations in some cases are dubious; but the facts already available appear to make it certain that at least two phases of channel cutting occurred in this area, and that between them ice advanced over the area and filled in many channels with drift. On retreat of the ice front some of the older channels were in part re-excavated, some were left drift-filled without reoccupation, and some new ones were cut. The interpretation from the standpoint of glacial geology is clearly a matter for geologists to decide, but it may be mentioned that in his address earlier referred to Anderson admitted that this accumulating evidence had inclined him towards the mono-glacial hypothesis for northern England with conditions of abundant meltwater, proglacial lakes, and channel cutting characterizing both advance and retreat stages. From the more limited standpoint of explaining the humped profiles the new evidence is not immediately helpful, save by widening the range of possibilities. The fact that many humped channels have now been proved to contain deep boulder-clay floors might seem to offer a ready solution on the assumption that the hump is no more than an incidental mass of residual drift deposited in the channel by ice advance and remelt subsequent to the channel's primary excavation; but against this one must set the evidence that many of the drift-plugged channels were undoubtedly re-used as overflows after glacial overriding, and that the humped profiles in their present floors, although cut in drift, are still essentially erosional profiles. The essence of the problem with which these notes are concerned, namely how a water-cut channel can acquire an (apparently) *erosional* profile going uphill and down again, still remains.

In these circumstances one's thoughts turn naturally to the third of the possible modes of origin suggested earlier in these notes, that some at least of the channels which exhibit an anomalous up-and-down profile may have been excavated, in part at least, sub-glacially. This idea does not seem to have as yet received much serious consideration in Britain, where thought has been perhaps unduly influenced by Kendall's concept of freely draining lakes despite the common and disturbing lack of any independent direct evidence for such lakes. On the continent and elsewhere, however, the idea has been fruitfully applied, as by Mannerfelt and his followers in the Scandinavian mountains,[2] and Dr. Mannerfelt strongly advocated to me an entirely sub-glacial origin for the Northumbrian Beldon and Dipton channels when I showed him the maps and sections. I felt at the time unable to accept this thesis for various reasons, but further study might resolve the difficulties I envisaged, and in other cases of anomalous channels the concept may well prove to be most helpful. Many problems are of course involved in such a concept including the ability of sub-glacial streams to erode large channels in solid rock, the possibility of their eroding uphill under hydrostatic head, and perhaps even the possibility of major concentrated meltwater streams flowing at all under thick land ice—a question on which recent investigations into the plasticity of ice under heavy load may well have some

[1] Anderson, W., "Buried-valleys and late-glacial drainage systems in north-west Durham," *Proc. Geol. Ass. Lond.* **51** (1940) 274–81.

[2] Mannerfelt, Carl M:son., "Nagra glacialmorfologiska formelement och deras vittnesbörd om inlandsisens avsmältningsmekanik i svensk och norsk fjällterräng," *Geogr. Ann., Stockh.* Arg **17** (1945) 1–239.

bearing. But the idea is, I am aware, under active consideration by some geomorphologists currently working in northern Britain, and one looks forward with interest to their published conclusions.

I have used the publication of Twidale's paper as an opportunity to bring forward some rather scattered comments and reflections mainly in the hope of stimulating further work in this field. Other aspects of glacial drainage channels clearly need study as well, for instance the mechanics of production of the typical "railway cutting" shape under the conditions postulated, but I have confined myself here to the phenomenon of "humped" profiles as it seems to be potentially at least of profound significance to the basic interpretation of these features. More comparative studies of surface morphology and relationships are badly needed, but it seems probable that no completely satisfactory answers can be expected without detailed programmes of boring to establish as fully as possible what were the original erosional forms of these channels, and how and to what extent they have been subsequently modified.

Editorial Note: Readers referring to C. R. Twidale's paper in the *Journal* for March 1956, should note that the two figures on page 91 are in the wrong order, and incorrectly numbered; Figure 5 should read Figure 6 and be printed below.

FROM THE *JOURNAL* A HUNDRED YEARS AGO

THE EXTRACT BELOW is from the obituary of the writer and traveller James Silk Buckingham (1786–1855), the centenary of whose death fell last year. Fellows will be familiar with the portrait of Buckingham in oriental dress which hangs over the main staircase of the Society's house, and his fine curved dagger is in the Society's museum. The conventional account of his life which appeared in the Presidential Address of Rear-Admiral F. W. Beechey for 1856 (*Journal of the R.G.S.*, Vol. 16, page clxxiii) gives little idea of Buckingham's delightful and interesting personality or of his adventurous life. He went to sea when only ten years old, and was on his third voyage when he was captured by the French and kept prisoner at Corunna. Some ten years later he was on his way east, where his "attempts to open up the journalism of India" involved him in spirited opposition to the authorities; his independent outlook, combined with a slander action he was obliged to bring against an ill-natured travelling companion, resulted in his expulsion from India and grave financial losses. He was, however, vindicated and later received the compensation of a small pension from the East India Company. Buckingham travelled widely in Syria and modern 'Iraq, and in Palestine; he made the journey from Aleppo to Mosul and Baghdad on his way to India in 1816, at the time when Claudius James Rich was at the Residency in Baghdad, and left a spirited account of his adventures. His autobiography, published in 1855, just before his death, is excellent reading, and shows him to have been more of a character and less of a conventional Victorian worthy than would appear from the following extract:

"He was born near Falmouth, in 1786. In his youth, he passed several years at sea, and also in a variety of occupations on shore; among which, his working as a compositor in printing offices proved of most influence on his career through life. He first became known in public affairs, by his attempts to open up the journalism of India. Mr. Buckingham first went to Calcutta about the year 1815, and always retained much interest in Indian affairs, and hailed with warm satisfaction the removal of the restrictions on the press in India, which the wise and liberal policy of Lords Metcalfe and William Bentinck at length effected. In 1825 he established in London a paper, the 'Oriental Herald,' the precursor of the 'Athenaeum' and of various other journals. On the way to and from India, Mr. Buckingham travelled through different countries, and afterwards published narratives of his travels. . . . Mr. Buckingham was one of the most pleasing and instructive popular lecturers, especially in describing places which he had visited. In 1832, he was elected M.P. for Sheffield in the first reformed Parliament, and retained his seat till 1837. In his political life, he chiefly took an active part in questions affecting social reforms; and the temperance movement had in him a zealous advocate. . . ."

Buckenham was elected a Fellow of the Society in 1853 on the recommendation of Dr. Thomas Hodgkin, the well-known physician of Guy's Hospital. Dr. Hodgkin, famous for his researches into morbid anatomy, was a founder of the Aborigines Protection Society and (to quote the Dictionary of National Biography) his house in Bedford Square was "the scene of much simple hospitality to philanthropists, ethnologists and geographers."

OXFORD ECONOMIC ATLAS OF THE U.S.S.R.: A RUSSIAN REVIEW

OXFORD ECONOMIC ATLAS OF THE U.S.S.R. AND EASTERN EUROPE. *Oxford University Press*, 1956. 10×7½ *inches;* 134 *pages.* 42*s.* (Review by P. M. Alampiev, L. M. Biushgens and E. L. Gurari. *From* 'Izvestia Academy of Sciences of the U.S.S.R. Geographical series,' 1956: No. 4, pp. 128–35.)

THE ACCURATE, objective provision of information on our country, its natural resources, economics and peoples to wide circles of the population of foreign countries is of the greatest importance in the development of economic and cultural ties between the Soviet Union and other countries. Not the least contribution to this important field is made by cartography, which has a wealth of means at its disposal for presenting a distinct, clear and at the same time accurate delineation of the economic and cultural life of the countries and regions within its geographical scope. It must be admitted that for many years the cartography of capitalist countries has done little to serve the cause of correctly informing the population of those countries about the economic life of the U.S.S.R., the development of her industry and economic and cultural progress in our country. . . . In recent years, however, cartographic publications in Capitalist countries have begun to break away more and more from the bad traditions of misinformation, tendentiousness and incorrect representation of the economy of our country and of its geographical distribution. Soviet cartographic material and the work of Soviet geographers and economists are coming to be more and more widely used, thus providing a wealth of material for the knowledge of the economic and physical geography of our country.

Among cartographic works which attempt to provide an objective presentation of the geography of the economy of the U.S.S.R. is the English 'Economic Atlas' of Oxford University. The 'Oxford Economic Atlas of the World,' which appeared in 1954 and became widely known, was reprinted with corrections in 1955. This atlas was meant to provide basic facts on the economic geography of the world for the broad masses of economists, geographers, students of universities and for practical use in industry, commerce and agriculture. Atlases of the Oxford University Press stand out among many foreign atlases by their greater reliability and in being more up-to-date; this obtains particularly in the delineation of frontiers, the transcription of geographical names and the characteristics of national economies. Having published a general economic atlas of the world, Oxford University has undertaken a series of regional economic atlases to supplement the information provided in the world atlas, and to map separate groups of countries in more detail. The first in this series is the 'Atlas of the U.S.S.R. and Eastern Europe.' This attempt to produce a series of atlases showing not only the economic characteristics but also the natural resources, population and some facts on the history of state frontiers is of undoubted interest to a wide circle of readers. The only series with a similar aim hitherto has been the Czechoslovak 'Economic Atlas' (1951–1954). The fact that the first of the series which the O.U.P. has published is that of the U.S.S.R. and Eastern Europe is significant. It bears witness to the great interest of wide circles of the English public in the Soviet Union, and countries of People's Democracy, and the desire of English cartographers to satisfy this interest. . . .

The inclusion of the Mongolian People's Republic in the atlas is rather odd, since —as we know—it is not situated in Eastern Europe. For the sake of completeness in showing countries which are closely linked together economically, and even from a purely cartographical point of view, it was unnecessary to include the Mongolian People's Republic; it would have been more convenient to include it in an atlas devoted to the Chinese People's Republic, India and Japan. Moreover, the map of

the Mongolian People's Republic is much poorer than those of other countries. The economic facts regarding it, as included in the atlas, are exceptionally meagre, and the compilers of the atlas frequently omit any mention of it in the text. One advantage of the Oxford atlas is that it contains a list of sources used, which helps in the evaluation of the scientific reliability, completeness and accuracy of the economic and other facts included. In contrast to a number of other foreign atlases, the O.U.P. atlas makes copious use of Soviet sources. The publishers state that "Russian material, not previously available in England, has been used." Soviet atlases are much drawn upon, in particular the 'Great Soviet atlas of the world' (1937–1939) and the 'Geographical atlas for teachers of middle schools,' 1954. Soviet geographical literature was used to a lesser degree. Apart from the 'Handbook of economic geography,' by Balzac and others, and the 'Handbook for middle schools,' by Baranski, no other works on economic geography were used. Yet there is rich material in the 'Economic geography of the U.S.S.R.' edited by Cherdantsev and others, and also in many works published by the Geographical Publishing house, dealing with individual areas and republics of the U.S.S.R. The compilers of the atlas used also Soviet periodicals, such as 'Communist,' 'Problems of economics,' 'Planned economy,' 'Socialist agriculture.' But it is hardly credible that the Soviet geographical serials 'Izvestia of the All-Union Geographical Society,' and of the 'Academy of Sciences' geographical series were not used, for they contain much new material which would have been useful for the compilation of both physical and economic maps. Among the foreign source materials used, some arouse an element of doubt as to their scientific quality.

Literature published in the People's Democracies was little used, as was literature published about them in the Soviet Union. For instance, the economic maps of the countries of People's Democracy contained in Soviet atlases are little used, which reflects upon the quality of the maps in the atlas where, as a rule, the distribution of production in the U.S.S.R. is shown with greater accuracy and in more detail than the distribution of production in the countries of People's Democracy. Of Czech sources, only the pre-war 'Atlas republiký Ceskoslovenské' (1935) was used, and new atlases which contain interesting and more complete physical and economic maps were not used. The most recent physical maps in the 'Klima Atlas' published in the German Democratic Republic (1953) was not used, nor the very interesting atlas of Poland edited by Janiszewski (1953).

The Oxford economic atlases are published in book form, convenient for use, but requiring comparatively small-scale maps. General geographical and physical maps are printed across two pages, other maps on single pages, with figures, drawings and tables opposite. The textual part of the Atlas does not predominate over the maps, as often happens in many foreign atlases, where the maps are literally lost in the text. In the atlas under review, the text is a useful supplement to the maps, helping the reader to grasp the contents of the maps and giving essential complementary information. . . .

The cartographical section of the atlas consists of two parts, of which the first contains a physical map of Eur-Asia, and the physical and general maps of the separate regions included in the atlas, while the second part contains special physical, economic and population maps. The physical and general maps are the only ones on large scales (1 : 6 million, etc.); the second part contains maps on the scales of 1 : 25 million and 1 : 50 million. Thus these maps are unlike those of the atlases produced by Hammond, McNally and others, as widely used in the West, which make use of a mixture of small and non-metrical scales. The system of projections calls for no special comment. The compilers were right to provide, on each map, not only the name of the projection used but also to provide the origin and standard parallels, since without this information, evaluation of the characteristics of the cartographical representation would be difficult. . . .

The physical map of the western U.S.S.R. (1 : 16 million) is excessively generalized: indications of height, roads, characteristics of population and settlements are lacking. Other maps in this section are also poor in content. For instance, in the 1 : 4 million

and 1 : 5 million maps, the features of the political and administrative importance of inhabited places are not shown, though these are given on the general maps, on a much smaller scale, in Soviet atlases. The scale of these maps would also permit of a greater number of populated places being shown. The representation of relief on all the maps in this section is only general: contour lines are lacking. Indication of height is not given throughout. The limits of elevations are too indefinite. This all means that the representation of relief is of a markedly generalized kind. The range of colours to indicate variation in elevation, as in all O.U.P. publications, is uncomfortable to the eyes and unusual: it is bright green for medium height, violet-grey for upper and reddish-green for lower.

The atlas benefits much from having the basic maps of the second section (natural conditions, population, transport, agriculture and industry) compiled on the same scale, projection, and with similar lay-out to the first section. In lay-out, the maps only differ in the positioning of lettering and text. This makes it easier to compare maps and facilitates the mental imposition of the content of one map on others, *e.g.* the soil map on the maps of agriculture, geology on the natural resources map, etc. A general fault of all the maps in the second section is a too meagre basis with a very generalized river network. Populated places are not shown at all on the physical maps. The only state frontiers which are clearly readable on the maps are those of the U.S.S.R. The physical maps include geological, relief, soil, vegetation, climate and precipitation and rainfall maps. These maps have no original scientific or informative value, as they appear basically to be generalizations of the maps in the Soviet 'Atlas for middle schools,' of 1954.

The compilers of the atlas under review, in their use of the maps from the 'Atlas for middle schools' have introduced an entirely unjustified generalization of the classification of soils, vegetation, etc. In comparison with the 'Atlas for middle schools,' they have enlarged the scale of the geological and soil maps and of the vegetation map from 1 : 30 million to 1 : 25 million, but they have decreased the detail of the classification by two to three times. This, of course, very much impoverishes the content of the maps of the atlas. The contours, mechanically transposed from the smaller scale maps of the 'Atlas for middle schools,' look too thick.

Such generalization of classification and insufficient detail in contour lines, as is shown by the experience of Soviet and foreign cartographers, is unnecessary. The special physical maps of the best Soviet and foreign atlases, prepared in much more detail, preserve good legibility and clearness, and are fully comprehensible not only to specialists but to others. The relief map on pp. 23–24 [*i.e* pp. 22–23—Transl.] is not very successful. As we know, half-tone representation of relief can produce a fine, plastic effect. In a number of foreign productions, notably Swiss relief maps by the Wensch method and others, the relief is distinguished by great clarity and effectiveness. This map, however, provides inaccurate presentation of the relief of the U.S.S.R. The unfortunate choice of scale and the insufficient half-tones on the map make the height of the Urals north of Konstantinov look the same as in the neighbourhood of Narodnoi and Sabli. The Urals look higher than the Caucasian ridge, while the valley character of the west Siberian plain is poorly shown. The schematic nature of the physical maps lowers the scientific and informative value of the entire atlas. An understanding of economics, the conveying of which is a basic task of the atlas, is rendered more difficult without sufficiently detailed maps of natural conditions.

In the section of special maps, much space is taken up by economic maps (about one-third of the total): each economic map is accompanied by a detailed text. The economic maps are placed in an order unusual to Soviet readers. The captions and lettering do not help the reader to grasp the meaning of the map. For some reason, a map of the textile industry is placed in a separate section, away from maps of other industries. The section on human geography contains very mixed maps, ranging from transport to ethnography and history. The atlas contains only one type of economic map, *i.e.* "distribution" maps of industry and agriculture. Combined economic maps

are omitted altogether, although these would show the economy of a country or region in its entirety—a basic matter in the contents of the atlas. In Soviet atlases, combined economic maps of the U.S.S.R. and of foreign countries are wisely used and arouse much interest among readers.

The economy of the Soviet Union is represented best in the atlas. The aim of the compilers was to obtain the fullest and most reliable representation of the Soviet economy, and this is clear. Soviet economy is shown in detail and conscientiously. The economic maps of the Soviet Union were compiled with use of Soviet sources, including the 'Great Soviet atlas of the world,' and the 'Geographical atlas for teachers.' The placing on the maps of small statistical tables and diagrams, dealing with the industry, agriculture and populations of the U.S.S.R. and countries of Europe, sometimes comparing them with other countries of the world, is of well-established informative value. The text on the reverse of the maps is connected with, and supplements, the contents of the maps. We shall not dwell here on the textual part of the atlas, since our concern is only with the geographical and cartographical aspects of the atlas. We would only mention that the texts contain a number of disputed and inaccurate interpretations of facts and, in places, incorrect information.

The industrial maps are of special interest among the economic maps. The industry of the U.S.S.R. is shown in sufficient detail, and accurately, except for some mistakes and inaccuracies which, however, are quite understandable in the carrying out of such a complex cartographical task. The industrial maps give wide presentation of the distribution of the main branches of the industry of the Soviet Union, showing the most important regions of concentrations of industry, and the many industrial centres, including recently formed places. The wealth and variety of the natural resources of the U.S.S.R. are shown. The economic maps reflect the settlement of new regions in the east and north of the U.S.S.R., the exploitation of new finds of useful minerals and the linking of industry with sources of raw materials and energy. The use of legends in the atlas is clear and interesting (*e.g.* the Pravdinsk and Krasnovishersk paper works shown as sources for paper for 'Pravda,' etc.). The maps of industry gain much from the addition of a number of insets on a larger scale than the basic map. The method used in the atlas of representing industries according to their industrial centres ensures the best presentation of the geographical location of industry. This progressive method is firmly entrenched in Soviet cartography and is now being more and more widely used in foreign atlases. But in the Oxford Atlas the advantages of this method are not fully made use of, on account of the weak quantitative characteristics of the industrial places.

Agriculture is shown in the atlas by dot maps. We think that the authors were justified in taking, not areas sown, but harvests as the basis for the representation of crop maps. It is true that their calculations, made with an insufficient knowledge of the varying fertility of certain regions, give a far from precise picture of the distribution of agriculture. The section of agricultural maps contains maps of the distribution of wheat, rice, potatoes, etc., though there are no maps for cotton, green vegetables, tobacco, lemons or vines. The absence of a map showing the number of head of cows makes it impossible to estimate the distribution of milk-producing animals. Each map shows two or three crops, each represented by a different colour. This method is usually accepted for purposes of economy. Only maize and millet are shown together with dots of the same colour, and oats and barley are also of the same colour. Thus the reader cannot determine which are the most important regions for these crops. In the maps for potatoes, and sugar-beet, the dots merge in the main regions into a red mass. This provides only a very general picture of the distribution of the crop, and in practice all the dots lose significance. A real fault in the atlas is the absence of complex agricultural maps, which would show the character of the agriculture as a whole and stress its characteristics according to countries, and regions, and would also give a more or less full representation of the agriculture of individual territories. The agriculture of the countries of People's Democracy is very poorly shown in the atlas,

and the economic content is only poorly discernible. The reader cannot obtain a clear impression of agriculture and of its geographical distribution in, *e.g.* Czechoslovakia, Hungary, Bulgaria, or even in such territories as Poland and Romania.

The comparatively small scale of the economic maps necessitates particularly careful choice, and placing of lettering, in particular of industrial centres in industrial maps. In a number of East European countries, this selection was not very successfully made, *e.g.* in Albania, where only one electricity station is shown, that in Tirana, supplying a textile combine and serving, in the main, its needs. The hydro-electric station at Selita is much more important. It would be possible to enlarge the contents of the maps of East Europe. In Albania, again, it would have been possible to show the wheat and sugar-beet crops. A number of other examples could be given. The correct positioning of lettering is of great importance in the geographical orientation of readers, particularly in view of the schematic basis, small scales used and the fact that many objects on the map have no lettering. Unfortunately the placing of lettering in the atlas is not always successful. In many cases, the lettering has "come away" from the conventional sign and one does not feel any strict logic in the selection. The use of different colours for the lettering is successful: the explanation of the signs and the text is given in the same colour as the caption on the map. This makes it more legible. The Atlas contains an index with geographical coordinates and consisting of some 5500 names. Towns with a population of over fifty thousand have the number of inhabitants shown in the index. Inhabited places of which the population has markedly increased within recent years have the numbers of population shown with both dates *e.g.* Chirchik 1939 : 10,000 : 1954 : 70,000. The political and administrative region to which a given settlement or other place belongs is also shown. The index contains short notes on the important economic centres *e.g.* 'Chernikovsk, R.S.F.S.R., pop. in 1954 225,000 : machine industry, chemical works, oil refinery,' etc.

We must say that, on the whole, the atlas is one of the best foreign atlases on the economy of the U.S.S.R. and will serve to spread a more accurate conception of the economy of the Soviet Union among a wide circle of readers than that given by many atlases published in Capitalist states. TRANSLATED BY D. WELSH

This review has had to be slightly abbreviated in translation by the omission of certain details elaborating the description of maps and index, and by the omission of a few sentences which, in translation, appear to repeat previous statements.—ED.

A RUSSIAN ECONOMIC GEOGRAPHY OF BRITAIN

VELIKOBRITANIYA: Ekonomicheskaya Geografiya. GREAT BRITAIN: An Economic Geography. By A. S. DOBROV. *Moscow: Gosudarstvennoye Izdatelstvo Geograficheskoy Literatury*, 1955. 9×6 *inches;* 436 *pages; maps and tables.* 15 *roubles*, 35 *kopeks*

ALTHOUGH A RUSSIAN translation of 'The British Isles' by L. D. Stamp and S. H. Beaver has been available in the U.S.S.R. since 1948, A. S. Dobrov's 'Velikobritaniya' appears to be the first important work on the economic geography of the United Kingdom ever to have been produced by a Soviet geographer. The author acknowledges his use of material both from the work of Stamp and Beaver and from

W. Smith's 'An Economic Geography of Great Britain.' He has, however, also used many recent sources, even some published in 1955, and his bibliography includes about 300 references which range from works by Marx, Lenin, and Stalin (as a general introduction) to various government handbooks of statistics.

After a brief introduction to the physical geography of Britain, A. S. Dobrov provides a lengthy section on the economic history of the country, followed by a systematic treatment of topics, dealt with in the order usually found in Soviet geographical textbooks, with industry preceding agriculture. The work appears to be well balanced, carefully prepared, and, with certain exceptions, accurate. It is not surprising, however, that the author's approach to the subject differs widely from that of other geographers who have written about the British Isles and his preconceived ideas regarding the economic development of a capitalist state lead him to make certain omissions and contradictions. For example, yearly unemployment figures are shown for the period 1910–39 but there is no reference to post-war figures, presumably because these would disprove his assertion that it is the policy of British capitalists to keep an appreciable percentage of the population without work. He argues that many modern British "bourgeois" geographers are apologists of the capitalist system. This has a negative influence on the scientific value of their works. Frequently they suppress negative features of Britain's present economy, ignoring the important influence of monopolistic capitalism. Soviet economic geographers must therefore use these works critically, and with reference to Marxist-Leninist doctrines. According to Dobrov, the economy of Britain entered the monopolistic stage of capitalistic development in the last quarter of the nineteenth century and is now largely controlled by a limited number of monopolistic concerns. The nationalization of certain branches of the economy after 1945, although ostensibly the beginning of a process of transition towards regulated capitalism (able to avoid economic crises and unemployment), was, in fact, only a means of strengthening the great monopolies with the help of state control and of providing them with cheap raw materials and services.

Although the work appears to be reasonably free from errors, there is an oversimplified map of "social areas" in Greater London on which everywhere south of the Thames is classified as "residential quarters of the middle classes." The maps are almost all accurate, but on one Rugby is in Lincolnshire and Erith near Cambridge, while on another, showing the railway system of Britain, A. S. Dobrov has distinguished between single and multiple track lines but has shown many of the latter with only one track.

With regard to the actual topics covered in the work, a number of points are worth noting. In the section on soils the author remarks on the lack of interest in this subject in Britain until the last two decades and on the inadequacy of British soil maps. He includes a map showing the distribution of seven soil types and his terminology is similar to that employed in Soviet literature on the subject. Considerable attention is given to attempts to divide Britain into regions and Dobrov announces his intention to publish a second volume on Britain dealing with the economic geography on a regional basis when sufficient material collected in the 1951 census is eventually published. He accepts with slight modifications the standard regions adopted for statistical purposes in Britain for his regional division of England, but subdivides Wales and Scotland into five and three regions respectively. He stresses that cultural and political features of Wales, Scotland and Northern Ireland make it essential to consider these parts of Britain as separate national groups. The section on Greater London seems excessively long and some of the space might more usefully have been devoted to studies of other urban areas. In his section on atomic power Dobrov has made use of the latest available material to produce a map showing the location of atomic establishments and an outline of plans for the construction of power stations during the next two decades. In his brief section on road transport he has nothing to say about the present inadequate state of our highways, thus missing a good chance to criticize one aspect of Britain's economic structure.

The bibliography includes references to works by Soviet authors in Russian and by non-Soviet authors translated into Russian or in their own languages. The fact that the English alphabet (and not a version transliterated into Russian) is used for all references in English both in the bibliography and in the text suggests that many Russian geographers, or at least those who are likely to use this work, have some knowledge of the English language. Dobrov shows his own familiarity with English by including such expressions as "No climate, only weather," and *gorokhovyy sup*—pea soup.

Unfortunately Dobrov's work is not available in English, for it includes sections which might be of interest to British geographers. It is often illuminating to see how a foreigner looks at one's own country, although in this case Dobrov has probably not been in Britain for any length of time. The reviewer suggests that before beginning the second part of his work on Britain, dealing with the economic regions, the author should spend at least a few months here. As a result, he would certainly change some of his ideas about the country and he might even feel inclined to reinterpret some of the figures he quotes. Nevertheless, he has produced as competent an account of the economic geography of Britain as could be expected within the limits set by his political outlook which, even if not his own, is the official outlook required by the Communist régime in the U.S.S.R.

J. P. COLE

TURKISH ODYSSEY

THE LYCIAN SHORE. By FREYA STARK. *London: John Murray*, 1956. 9×6¼ *inches;* xii+191+viii *pages; map and plates.* 25*s*

EUROPA MINOR. By LORD KINROSS. *London: John Murray*, 1956. 8¾×5¾ *inches;* xii+167 *pages; sketch-map and plates.* 18*s*

BOOKS BY English travellers in Turkey are appearing thick and fast. The two reviewed here cover, in part, much the same ground—the south-west coast of Asia Minor—and they set a high literary standard. The authors sail (at different times) in the *Elfin*, the motor-yacht of the British Consul-General at Smyrna who personally steers them round that gulf-indented coast. Both Miss Stark and Lord Kinross are deeply interested in the classical history of the country, but there any resemblance between 'The Lycian Shore' and 'Europa Minor' ceases. So unlike are the two authors in temperament that we can hardly imagine them "doing" the "Turkish Riviera" together in the confined space of the *Elfin*.

In 'The Lycian Shore'—half of which is Lydian and Carian—Miss Stark sets sail from Smyrna. She is in love with Greek history. This is a journey into the past, and particularly a philosophical journey into the fourth century B.C., in the footsteps of Alexander's campaign in western Asia Minor. With Xenophon and Strabo, Pausanias and Herodotus never far away, Miss Starks keeps us in good, if rather serious company. She and the Consul-General make their leisurely way round the Doric peninsula, clamber over the forgotten ruins of Cnidus and Loryma (where they just avoid arrest), and brave the cross-winds of the Chelidonian Cape to reach the still-burning flame of the Chimaera. Throughout this enviable Odyssey Miss Stark, in the full maturity of her prose, keeps us amply informed of the involved, battle-torn history of the times when these shores were vigorous and young. But as she remarks, "to fit such a picture into the incidents of modern travel is no easy matter," and I do not feel that in this she has been altogether successful. Despite her great skill, we are aware of some disturbing jolts as we are switched from the classical past to the small incidents

of the present day. The components may not be immiscible, but they cannot be mixed without a considerable amount of shaking. It is, I am sure, my own fault that I am not as interested as Miss Stark in the Lycian Federation, dislike battles, am quickly bored by a surfeit of Lycian tombs, and prefer landscape and people to the confused history of what are often very similar and dilapidated ruins. Nevertheless, there may be others who share my prejudices. They may want to be told what the Lycian coast actually looks like, and such a prosaic desire will be more adequately satisfied by reference to Miss Stark's photographs (some of great beauty) than to her text. 'The Lycian Shore' is a happier, less oracular book than her earlier work on western Turkey, 'Ionia.' If I want to be told more about the Turkish countryside, it is because the author has a marvellous eye for detail and can describe her impressions with supreme sensibility. Her description of a seal fishing off the Rhodian Peraea, of tortoises mating at the ruins of Caunus, are passages of genius. These subjects are ageless, and it is perhaps because of this that she warms to them and is moved to communicate her pleasure. But I wish she would put down her reference books and write from the heart more often.

In 'Europa Minor' Lord Kinross travels in the opposite direction to Miss Stark. The past is kept firmly in its place—to illuminate the present. His enthusiasm, energy and patience are almost inexhaustible. Descending from inner Anatolia (the subject of his earlier book, 'Within the Taurus') to Iskenderun, he whirls us westward in any local transport he can find. Well-informed, worldly and witty, fond of good living but seldom getting it, we follow him on his progress from the cotton barons of Adana to the Roman aqueducts and medieval castles of Cilicia Trachea. At sultry Anamur, the most southern village in Turkey, he stays in the Banana Palas Otel. The amusing account of his visit to the Kaymakam is one of the best things in a book which should serve as a guide to all travellers in Turkey. At Antalya he joins the Consul-General and together they sail round the Lycian coast—a journey not without its misadventures. They are arrested at Patara in their bathing shorts while the *Elfin* (with their passports aboard) is out of sight in the next cove. But this is an occupational hazard that must still be faced by travellers in the wilder parts of Turkey.

Lord Kinross writes well, and can describe landscape with uncommon sense and perception. His picture of Greek life in Miletus is coldly but effectively drawn against a background of erosion and deposition: the silting up of the Latmic Gulf by mud brought down by the Meander. He gives us an excellent account of the well-excavated ruins of Ephesus and the cult of Artemis, then hurtles on, by way of the petrified falls of Hierapolis, to the great theatre of Pergamum. The concluding chapters describe the Byzantine baths at Bursa, and give a loving portrait of Istanbul where the mosques of Sinan are given the recognition they deserve. It is good, too, to find the conversation recorded of that eccentric Byzantophil, the late Professor Whittemore, who uncovered the mosaics of St. Sophia. He might have been invented by Henry James. Although there is never a dull moment in 'Europa Minor,' there is something which comes between the author and his subject—and the reader. We are aware of a nostalgia for Greece, for a continuity between the past and present which is no longer to be found on the Turkish coast. Throughout the book—but especially in the touching account of the dying Greek island of Castelorizo two miles from the Lycian strand—we can detect a dichotomy of sympathies that was less apparent in 'Within the Taurus' where the Turkish way of life was in harmony with the rigours of the plateau. On the Mediterranean coast, with its gracious landscape and Greek past, we are inevitably disturbed by the "unmediterranean" aspects of Turkish life—by the serious way in which the Turks take their pleasures, and above all by their slowness to use and enjoy the sea. This would put a burden on any writer, and even the shoulders of Miss Stark have stooped a little under the strain. But in her case it was easier to bridge the gulf by the simple expedient of telling us very little about the Turks. But Lord Kinross cannot so easily escape. He admires the sterling qualities of the Turks (in many ways so like the Scots), but a tempered, cerebral admiration may

not be quite enough if a travel writer is to put his readers at their ease. He may feel a little guilty that we are being entertained at the Turks' expense. The situation is difficult, perhaps unavoidable. If one wants to write about the classical world, to relate it happily to the present, it must be very much easier to do so in Italy or Greece than in modern Turkey. A fisherman in the Cyclades, standing at the prow of his *caïque*, can blow upon a great conch shell and remind us that the world of Homer is not dead. P. H. DAVIS

REVIEWS

EUROPE

ROCKALL. By JAMES FISHER. *London: Geoffrey Bles*, 1956. 9×5½ *inches;* 200 *pages; maps and illustrations.* 18*s*

When H.M. Government formally annexed the island of Rockall Mr. Fisher, the well-known ornithologist, was an obvious choice to accompany the mission. He had already made air and sea voyages to Rockall and had collected a great deal of information about bird life on the island. Perhaps in return for his participation in the annexation of the island he has provided a most readable and entertaining volume in which he has attempted to trace all recorded observations and notes concerning the position, size, geological origin and organic life on the island. In some cases he has had to judge whether the reports were culled from hard experience or were the outcome of pure Münchausen devilry.

The book is well illustrated by a number of photographs and maps. The latter include both early maps and Admiralty charts, for the Rockall bank has long been an important fishing area. The photographs have been well reproduced but lack the clarity which enabled the author to deduce the information stated in the captions. (For example, the reviewer cannot make out from the photograph facing page 101 the twelve out of the thirty-two guillemots "in incubation attitudes"). A general but not, it is hoped, unfair criticism of the book is that the author assumes that the reader is already familiar with the habits and life of the bird population of the island. Perhaps this omission from the main text is compensated by a special feature of the book, the appendices. These sections have been compiled by specialists and form a useful source of information on the geology, the bird and plant associations and intertidal zoology of the rock. Together they form a welcome complementary part to the general lucid history of exploration of the island. R. H. J.

GERMANY'S EASTERN NEIGHBOURS. By ELIZABETH WISKEMANN. *London: Oxford University Press*, 1956. 9×5½ *inches;* 309 *pages; maps.* 30*s*

This book gives a dispassionate and methodical account of how Germany's eastern frontiers came to be where they are now and of the population changes resulting from the war and its aftermath. To a concise analysis of the problems involved the author, with her unrivalled knowledge of Slav-German relationship, has added a full bibliography from which the reader bent on a more detailed study can evaluate Miss Wiskemann's sources and form his own conclusions from the masses of partisan information available in other languages.

The human (and inhuman) factors involved and the outrages committed in recent years by both Germans and Slavs have roused passions which make any rational discussion between the contesting parties impossible. Historians, moreover, can take their arguments back into a past so remote that, even when valid, such arguments can have but little bearing on present-day rights and wrongs. Anglo-Saxon feelings on

the *status quo* have been influenced chiefly by the inability of our politicians to agree with the Russians, at Yalta and afterwards, as to whether "the Neisse" meant the eastern Neisse or the western Neisse; so that the German–Polish frontier remains unsettled and is to be determined by the eventual peace treaty with Germany, for which the coming into being of a re-united Germany is a necessary prerequisite.

Miss Wiskemann thinks that the bulk of German opinion favours a restoration of the 1914 frontiers. Since any such hopes, however, are obviously impracticable at the present time, the West German government has always insisted that until a peace treaty is signed their legal frontiers are those of 1937 and that the portions of pre-war Germany now incorporated in Poland should be shown on maps as "under Polish administration," with German place-names preserved as the official names in these areas. Eastern Germany, where public opinion is inarticulate, has been forced to recognize the present Oder–Neisse frontier as final and there the matter must rest until considerable changes, as yet unpredictable, take place in the political structure of Eastern Europe.

The economic and ethnic problems created by the emigration or deportation to Germany of some seven-and-a-half million Germans from Poland and two million from Czechoslovakia are also examined in the scholarly manner which distinguishes the work of this author, and one must conclude that to the east of the Oder-Neisse line the economic leeway created in the Polish and Czech frontier areas by the loss of so many efficient German workers is well on its way to being made up. Within Germany itself the integration of refugees and deportees proceeds in a way that is little short of miraculous and is now nearly complete. It is a pity that the author can tell us so little about the fate of the historic city of Königsberg, now Kaliningrad, or of that of its German inhabitants. But that is not her fault: the information is just not available and the assembling of it will have to await the granting by the Soviet Union of greater facilities for visiting its recently acquired Baltic dependencies. A. D.

KRAJOBRAZY POLSKI (The landscapes of Poland). By STEFAN JAROSZ. *Warsaw: Budownictwo i architektura*, 1956. 11½×8 *inches; 402 pages; illustrations and map.* 85 *zl.*

The remarkable development of geographical studies in Poland (there are seven university schools of geography now to one before 1939) is of course due to the recognition by the state of the value of geography in economic planning. Not, however, that all Polish geographers were at once able or even willing to undertake the reorientation in approach required by this concentration of most if not all aspects of geography upon one single purpose: but in the last twelve months a new note of real enthusiasm seems (to an outsider looking in) to have arisen in Polish geography as a whole, and this can but arouse sympathetic interest on the part of geographers in the West. Dr. Jarosz' book is an interesting example of this reorientation. As the outstanding, if not the only bio-geographer in Poland today, Dr. Jarosz was commissioned by the Institute of Town Planning in Warsaw to produce an "interpretation" of the regional landscapes of Poland for the use of town and country planners. With this specific audience in mind, Dr. Jarosz has provided a series of brief descriptions, primarily in terms of vegetation, of some eighty landscape "units" in Poland. For English readers, the main interest of the book consists of the 375 photographs, many full-page, to which captions in English are provided. The quality of these is of a uniformly high standard—Dr. Jarosz' skill as producer of geographical films is well-known in Poland and the Soviet Union—and we can but hope that this book is the forerunner of others on the same generous scale and with the same scientific purpose, to replace those lavish "albums" issued so copiously from Eastern Europe since 1945.

D. W.

ASIA

THE GREAT LOOCHOO: A study of Okinawan village life. By CLARENCE J. GLACKEN. *Berkeley and Los Angeles: University of California Press*, 1955 (*Cambridge University Press*). $6^{1}/_{2} \times 8^{3}/_{4}$ *inches;* xvi+324 *pages; maps and photographs.* 34*s*

The Great Loochoo was the early explorers' name for Okinawa, the largest of the Ryukyu (or Loochoo) islands, which lie between Japan and Formosa. Since the closing stages of the Second World War this island group has been so much in the news that it is difficult to realize the extent of its isolation in pre-war days. In fact, however, there can be few areas which have seen so rapid or dramatic a change in their relationships with the outside world and in view of the extremely important strategic rôle which Okinawa has now assumed it is particularly desirable that Western ignorance concerning it should be dispelled. Professor Glacken's book may be heralded at once as a most useful contribution to that end. While no doubt there will be some purists who, observing the lengthy and detailed treatment of such topics as family and community life, religion, and social change, will feel bound to dispute the author's opening remark that "this is a study in human geography," a much larger proportion of its readers will surely be far more impressed by the skilful manner in which these and other aspects of the regional culture are related to the basic facts of the geographical environment. The result of this very successful combination of the techniques of geographical and sociological investigation is a book of both factual and methodological interest, and the picture which it reveals of a culture, essentially similar to that of rural Japan, though with some interesting variants of its own, is well-rounded and convincing. The book is well illustrated and its maps, though less numerous than one might wish, are commendably clear. C. A. F.

NATIONALISM AND REVOLUTION IN MONGOLIA. By OWEN LATTIMORE, with a translation of Sh. Nachukdorji's LIFE OF SUKEBATUR by Owen Lattimore and Urgungge Onon. *Leiden: E. J. Brill* (*Published under the auspices of the Institute of Pacific Relations*), 1955. $6^{3}/_{4} \times 9^{3}/_{4}$ *inches;* x+186 *pages*

In an introduction to Gerard M. Friters' book 'Outer Mongolia and its international position' (Baltimore, 1949), Professor Lattimore drew a comparison between Sukebatur and Sun Yat-sen as fathers of national revolutionary movements. The present book is an attempt to follow up this line of reasoning by giving a translation of the official life of Sukebatur (1893–1923) and prefacing it with an introductory essay which in fact is of equal length, viz. 90 pages. The 'Life' is highly coloured and its jargon is only too familiar, but it clearly shows the way in which the Government of the Mongolian People's Republic was endeavouring to mould public opinion during the latter part of the Second World War. Thus, we are told, in spite of his noble deeds and high aspirations, Comrade Sukebatur had many enemies. The clerical and secular feudal interests, seeing their power and authority diminished by his efforts, determined to eliminate the People's Party and Government and so they killed him by poisoning. But, the author concludes, "the Mongol people, on the road of Sukebatur, under the leadership of Choibalsang, and with the great aid of the Soviet nation will without fail fully accomplish the war objectives that it has set before itself."

The 'Life'—which is probably the first contemporary Mongol book to be translated into any Western language—will undoubtedly be of great interest to students of Central Asian and Soviet affairs. But to the political geographer the most useful part of the book is Professor Lattimore's introductory analysis of nationalism in Mongolia and, in particular, of the differences between Inner and Outer Mongolia and the nature of the satellite relationship in general. For, as he points out, Outer Mongolia, after being a satellite of Tsarist Russia from 1911 till the end of the First World War then became the first of the satellites of the U.S.S.R.; contrary to a commonly held view this does not mean that it is merely a replica of one of the Soviet Republics proper which has not been formally annexed. The author draws two significant con-

clusions from his analysis; first that there is no indication of any preparatory move for the unification of Outer and Inner Mongolia and, secondly, that the policy of Peking towards the inhabitants of the latter appears to resemble not the recent policy of the Russians towards Outer Mongolia but rather that which they adopted in early Soviet times towards the minorities within the Russian frontier. This is a valuable work and throws much new light on an obscure but nevertheless important subject.

C. A. F.

VILLAGE LIFE IN MODERN THAILAND. By JOHN E. DE YOUNG. *Berkeley and Los Angeles: University of California Press*, 1955 (*Cambridge University Press*). $6\frac{1}{4} \times 9\frac{1}{4}$ *inches;* x+225 *pages; maps and photographs.* 26*s*

In view of the shortage of literature dealing with contemporary Thailand this new study by a Professor of Sociology in the University of the Philippines is most welcome. Moreover, although the author has concentrated his main attention on the areas of subsistence farming outside the Menam delta, he has not neglected the latter area entirely and indeed the comparisons which he draws between the commercialized and subsistence economies of the country form one of the most interesting features of the book. As would be expected from its title, a substantial part of the study is devoted to an examination of social organization and religious beliefs and the extent to which these are being modified as a result of external pressures. All things considered, it seems that Thai peasant society has adapted itself with uncommon success to the new forces of the twentieth century and there is no evidence of the disintegration which so often occurs when a peasant society is rapidly subjected to the processes of modernization and Westernization. The problems of livelihood and welfare are also treated at some length and here, again, the picture which emerges is an encouraging one. In contrast to his counterpart in the more congested countries of Asia, the Thai peasant enjoys a comparatively high standard of living and reasonably good health. Nevertheless the present government, with considerable assistance from the United Nations and the United States, is actively promoting a variety of projects, notably in public and animal health, road construction, fish conservation and large-scale irrigation which should result in further substantial improvements in the well-being of the population as a whole. This book makes pleasant reading and there is no reason to doubt the validity of its conclusions. It can be confidently recommended to all students of South-east Asian affairs.

C. A. F.

KAZAK EXODUS. By GODFREY LIAS. *London: Evans*, 1956. $8\frac{3}{4} \times 5\frac{3}{4}$ *inches;* 230 *pages; maps and illustrations.* 15*s*

The way of life of the Kazaks of the Altai and Kuen Lun was tough—tough as in the days of their ancestors Genghiz Khan and Tamerlane. The picture painted by Godfrey Lias is one of seasonal moves to and from the high pastures, of hunting, of hawking, and of the guerilla warfare in which they excelled. He shows up the Soviet policy of bedevilment intended to create such chaos that absorption of all eastern Turkestan into the Communist regime would be justified. The Kazak's choice of mass migration, rather than alien domination, marked the climax of a twenty-five years fight to retain their way of life, and their long quest for freedom recalls the Exodus of the Children of Israel. At first Tungans and Kazaks joined in a common Moslem Front, but early in 1929 the former quitted. With sorely diminished numbers and hampered with heavily laden baggage animals, the Kazaks fought a stubborn retreat across the lofty Tien Shan and the Kuen Lun, traversing the latter in deep winter. Attempts to reach Tibet created suspicion and hostility, and when, many marches further west, they reached the frontier post of Rudok they were turned back to face the Reds again. After two more months of savage fighting permission to enter Kashmir arrived. But the sorely tried refugees were not welcomed by their co-religionists. For Kashmir had her own troubles and these Ishmaels could not settle down there. Not only their sorry plight, but the manner of their brutal exiling was con-

cealed from the West, and only after fifteen months of oblivion did the United Nations become aware of the circumstances. Transportation to Turkey was arranged, and here Godfrey Lias met the leaders of this mutilated race, with their heads still unbowed. His account of their epic struggle, carried on with indomitable courage, deserves to be widely read and is well worthy of study in these days when "colonialism" is so much shouted down. H. W. T.

LORDS OF THE MOUNTAINS. Southern Persia and the Kashkai Tribe. By MARIE-THÉRÈSE ULLENS DE SCHOOTEN. *London: Chatto & Windus*, 1956. $9^{1}4 \times 6$ *inches;* 128 *pages; sketch-maps and photographs.* 18*s*

The name of Madame Ullens de Schooten will already be familiar to many Fellows of the Society from the remarkable film with the same title which she has shown in this country at the International Congress of Orientalists of 1954 at Cambridge, at the Edinburgh Festival and in London, as well as on the continent. This book describes the several journeys on which the pictures were taken, most of them in the learned and inspiring company of Monsieur André Godard, Director General of the Department of Archaeology in Persia, and Madame Godard. The actual *déplacements* from Tehran were made, alas, by taxi, jeep or lorry, but that is perhaps inevitable in present-day circumstances. Once at her destination, however, the author did not fail to make the best of her opportunities. She records with skill and charm the profound impression made upon her by the mountain scenery of the Alborz, the architectural marvels of Isfahan, the antiquities of Persepolis or the gardens of Shiraz; and there are many deft sketches of people and incidents which will delight readers who have themselves had the good fortune to travel in that country. The most interesting chapters, since they cover less familiar ground, are those dealing with two visits which the author made, as the guest of the Il-Khani, Nasir Khan, to the great tribe of Qashqay, the first in their winter quarters around Firuzabad and the second at their spring camps on the slopes of the Kuh-e Dinar. Here she saw something of the nomads actually on the march (the description of this is particularly well done) and collected information, some of it on the authority of the Il-Khani himself, concerning the composition of the tribe their customs, and what they themselves believe about their own history. A generous allowance of admirable photographs, eight in colour and forty in monochrome, adds greatly to the interest of the book. The two small sketch-maps are adequate for a work not primarily concerned with geography. The appendixes include a useful bibliography of about 120 titles, but some very uneven and not always accurate notes on the other principal tribal groups of Persia, which the author did not herself visit, might well have been omitted. C. J. E.

INDIAN CLIMATOLOGY: Climostatics. Climatic classification of India with special reference to the Monsoons. By S. B. CHATTERJEE. *Calcutta: Das Gupta*, 1956. 10×6 *inches;* 417 *pages; maps, charts and diagrams.* 20 *rupees*

This is an advanced treatise embodying the results the statistical analysis of various meteorological and economic problems relating to the climate of India and Pakistan, including investigations of the author's own on continentality, aridity and the monsoons. Thus Dr. Chatterjee's volume makes a considerable contribution to Indian climatology, though it must be admitted that the incoherent arrangement through the inclusion of articles previously published in journals, the mathematical character of many of the discussions and the heavy verbose style make rather difficult reading.

Throughout the book much emphasis is placed on principles of climatic classification but it cannot be said that categories are always logically defined. Take, for example, the following passage on page 396: "In general convective thunderstorms occur in India with greater frequency than any other type and are common during the summer months. Other types are (1) heat thunderstorm, (2) thunder shower, (3) local thunderstorm, and (4) thundersquall." But all thunderstorms are fundamentally convectional phenomena, and on the basis of convection itself it is difficult

to avoid the conclusion that these several categories are distinctions without any real differences such as would be logical in theory or identifyable in practice.

More conciseness with the elimination of redundancies would certainly enhance the scientific value of a future edition of this compilation. L. C. W. B.

AFRICA

TANGANYIKA: A review of its resources and their development. Prepared under the direction of J. F. R. Hill, Member for Communications, Works and Development Planning, and edited by J. P. Moffett, Commissioner for Social Development. (Government of Tanganyika, 1955.) *Dar-es-Salaam: Government of Tanganyika*, 1955. 10×6 *inches;* xviii+924 *pages; maps.* 43*s* 8*d*

This volume is a comprehensive inventory of the resources of a vast territory. Its importance is emphasized by the almost simultaneous publication of the 'East Africa Royal Commission, 1953–55, Report' (Cmd. 9475) and the subsequent issue of the Governor of Tanganyika's despatch (Cmd. 9801, 1956) which estimated that the cost of all the Commission's recommendations in Tanganyika alone would be of the order of £48 million over the next ten years. It was written in 1951–52, mostly by heads of departments who describe the territory's requirements as they saw them at that time. The annual *Statistical Abstract*, compiled by the East African Statistical Department, is intended to be used to keep up to date this volume which should, therefore, remain an indispensable work of reference for many years. Geographers will find every one of its ten parts important, even those with which they may not be primarily concerned, such as "Political structure," "Social services," and "Finance."

The first section, "The country and the people," gives in forty pages many of the essential background facts of topography, history and population. "Communications" describes, in six chapters, the past history, present position and future plans for ports, roads, railways, air and other communications: the need for cheap and efficient transport is clearly recognized as fundamental for a developing country. There follow two sections dealing with production and occupying over 500 pages. The first discusses "the fundamental factors" of land (including tenure, soils and the great Tanganyikan problem of the tsetse fly); labour; and water, of which it is said, "its importance and its attendant problems bulk largely and constantly in the lives of every inhabitant." The second section is concerned with economic resources, and for a territory whose basic economy is agrarian most space is rightly given to agriculture and livestock, with other chapters devoted to fisheries, forestry, game, minerals (including a valuable summary of the geology), electricity, and the tourist trade. Production of exportable surpluses, as well as the attainment of self-sufficiency in food supplies, are discussed. There are also interesting accounts of "the beginning of what may become an agricultural revolution"—mechanization, and of the Overseas Food Corporation whose work, after the initial costly and much publicized failure of the "groundnut scheme," has been completely reorganized so that "it may well make a significant contribution towards the unsolved problems of converting unoccupied but potentially productive areas of Africa into food-producing regions."

"Trade" includes, besides the obvious topics, some discussion of the development of secondary industries and an account of the growth of cooperation. "Urban development" is an interesting section of over forty pages. Only 2 per cent. of the total population lives in urban areas, and town planning is still a new activity in the territory, but there is a clear awareness of the problems of urban areas, and the chapter on individual towns makes available information that is so often extremely difficult to find. Furthermore, an annexe lists each district headquarters, with all the data (except population statistics) systematically given in a series of columns. Finally, "General development" summarizes the ten-year development and welfare plan, in which the expansion of communications and the conservation and development of natural resources very properly take the leading places.

Besides the text, there are 11 maps, mostly on scales of 1/2M, 1/4M and 1/8M, 61 tables, 9 charts, a select bibliography and a detailed index of over fifty pages. The volume fully maintains Tanganyika's reputation for excellence in its publications which include the annual report, submitted to the United Nations Trusteeship Council, and its atlas, of which a new and much revised edition is expected shortly. The work was prepared under the direction of the Member for Communications, Works and Development Planning, but our special debt is to the editor, Mr. J. P. Moffett, Commissioner for Social Development. It is good to know that he is also responsible for what will be a complementary volume, the new edition of the 'Tanganyika Handbook.' R. W. S.

THE ZAMBEZI EXPEDITION OF DAVID LIVINGSTONE 1858–1863. Edited by J. P. R. WALLIS. (Central African Archives: Oppenheimer Series, No. 9.) *London: Chatto and Windus*, 1956. 10×6½ *inches; 462 pages; illustrations and a map. Two volumes.* 84*s*

THE SOUTHERN AFRICAN DIARIES OF THOMAS LEASK 1865–1870. Edited by J. P. R. WALLIS. (Central African Archives: Oppenheimer Series, No. 8.) *London: Chatto and Windus*, 1954. 10×6½ *inches; 253 pages; frontispiece and a map.* 35*s*

The Livingstone Centenary Celebrations of 1955 were marked, among other events, by the publication, in their original form, of certain diaries, despatches and letters written at the time of the Zambezi expedition. The material contained in these two fine volumes is part of a collection of Livingstone's papers presented to the Central African Archives by his great-grand-daughter, Miss D. L. Bruce. The items in this collection were originally gathered together from many sources by Livingstone's daughter, Mrs. Agnes Bruce, and used as the basis of the first biography of the explorer, written by Dr. Blaikie and published in 1880; they include letters to Sir Thomas Maclear and to Sir Roderick Murchison, a mass of general correspondence, journals of early travels in Bechuanaland and to the Zambezi, and a number of Baines' water-colours. The journals printed here are neither complete nor consecutive, but coherence is given to the whole by Dr. Wallis' lucid introduction; the fifteen water-colours, two by Kirk and the rest by Baines, are beautifully reproduced. The neat map, prepared by Professor Frank Debenham and included in both volumes, is of course adequate, but one map to two volumes is a meagre allowance where Livingstone is in question, and more elaborate geographical illustration would have been appropriate to the high standard of production in the Oppenheimer series.

The story of the Zambezi expedition is well known, and little new light is afforded by Livingstone's daily jottings and by the letters, both private and official, in these volumes. More space is given to the unhappy altercations and misunderstandings which were a feature of the expedition than Livingstone allowed himself in his official account. There are some bitter, and very significant, passages about Charles Livingstone, who certainly emerges from these unedited pages as the evil genius of an unlucky enterprise. Where the publication of these papers is really valuable is in the light it throws on Livingstone himself, in ways small and great—his pawky Scottish humour, as when he writes of the *MaRobert's* engine which was "probably intended to grind coffee in a shop window," or deplores the fact that "most high church people lean on wives and sisters"; his ruthless resolution as he batters at the impassable Kebrabasa rapids, or fights the African fever with ferocious home-made pills; most typical of all, his practical piety emerging quaintly in reflections on the hereafter: "I . . . imagine, from the manner the bible describes it, we have got too much monkery in our ideas. There will be work there as here." Last of all, and how one wishes it were otherwise, the feet of clay must be accepted, in Livingstone's hasty and unjustified treatment of Thomas Baines; in this connection is it not a pity that the excellent index should contain under "Baines, Thomas," the entry "fraudulent activities of"? Baines has long since been cleared of any charge beyond perhaps the

one, also levelled by Livingstone against Thornton, of being unable to "rough it in the field."

To review Thomas Leask on the same page as David Livingstone is perhaps to put a minnow in with a whale, but Leask was a good minnow and his journals are well worth preserving. He came from Orkney, and went out to Natal to make his living in 1861; a collection of his diaries and papers have been presented to the Central African Archives by his daughter Miss Lucy Margaret Leask. Between his arrival in Africa and 1870, when he settled down to keep a store at Klerksdorp in the Transvaal, Leask travelled much and had ups and downs of fortune. He knew and described in his private notebooks the Matabele and Mashona territories, and visited the Bakwena when they were living under Livingstone's convert Sechele. There is nothing in Leask's journals to inspire or to terrify; he was neither a missionary nor an explorer, and was subject to none of the stresses of the dedicated. He was a cheerful, independent, courageous Scot whose record of what he saw builds up into an interesting picture of South Africa in the making. The map is very sketchy, lacking a scale and not clearly related to the country as a whole. D. M.

AFRICAN TRAVEL

SOUTHERN AFRICA: TODAY AND YESTERDAY (*London, J. M. Dent; New York, E. P. Dutton*, 1956. 30*s*) is a revision and expansion of Mr. Wells's 'South Africa: A Planned Tour.' The guide-book part of the original volume remains, although expanded and brought up to date, and any intending visitor to South Africa or the Central African Federation would find in it much useful and often entertaining information. Mr. Wells, however, is interested in people as well as in places. Much of his new material describes recent political history and present political personalities. He is remarkably impartial when setting out current conflicts in the Union, and his summary of Dr. Malan's definition of apartheid and the criticisms of that statement by opposing South African newspapers is illuminating. Mr. Wells, who has had nearly thirty years of close contact with Southern Africa, has tried to describe as many modern economic, social and political developments as possible, varying from the Kafue and Kariba river electricity schemes to the controversy over the removal of the African inhabitants from Sophiatown, and to the activities of the newly formed Liberal party. While from its nature 'Southern Africa' is hardly to be read straight through, yet it is well designed with many clear sub-chapter headings and an excellent index, so that reference to any particular place or subject is easy. Reference sections at the back of the book include a list of places and things to see, a chronological table of the chief historical events in South Africa, two pages of useful Afrikaans words and phrases, and a select bibliography.

I SPEAK OF AFRICA, by Kathleen Courlander (*Robert Hale*, 1956. 18*s*) is also concerned with a journey in South Africa and the Central African Federation. Miss Courlander's book is slighter than Mr. Wells's, which is not surprising as she paid only a short visit of six months or so to South Africa, and she deliberately avoids politics. However, in some cases she gives even more information than Mr. Wells does, as for example in the description of a monument erected in Port Elizabeth to the memory of the horses which died in the South African war. Mr. Wells describes the memorial and leaves it at that, but Miss Courlander conscientiously tells us that the sculpture was "designed in the offices of the Metropolitan Drinking Fountain and Cattle Trough Association, London." However, in spite of certain infelicities of style and a plethora of lapis lazuli skies, the book, which deals almost entirely with "white" South Africa, is readable enough.

ON SAFARI (*Robert Hale*, 1956. 16*s*) is the autobiography of Ada Cherry Kearton, who, under her maiden name of Ada Forrest, was South Africa's first internationally famous soprano. She gave up singing as a career when she married the well-known wild-life photographer in 1922, and much of the book is concerned with her travels

with her husband. In the early chapters she describes her childhood in Durban and later in Barberton, then only a handful of miners' tents, and outlines her musical career. She writes of the journeys she and her husband made in the Sahara, East Africa, Australia and New Zealand. Her account of Dassen Island, which lies off the South-West Cape, and its penguin community is interesting, although hardened Antarctic travellers would be amused to read on the blurb that Dassen, which lies in lat. 33° 25′ S., is an "Antarctic island." Altogether, 'On Safari' is a slight but entertaining mixture of autobiography and travel.

Oskar Koenig is a "White Hunter" with a great love for the unspoilt country of the Masai. THE MASAI STORY (*Michael Joseph*, 1956. 18*s*) is an account of his various expeditions to South Masai Land, ranging over the past twenty-five years. Although in no sense an anthropologist, Mr. Koenig has had numerous contacts with this nomadic tribe which seems to cast a spell over so many Europeans, and he learnt a good deal about the tribal society from his guide, half Masai and half Ndorobo. He speculates on the history of the Masai, and his account of the prehistoric wells of Ngassamat, now used by the tribe for watering cattle, is fascinating. Mr. Koenig, as becomes a "White Hunter," tells several animal stories and describes some of the less publicized difficulties facing the leader of a "civilized" safari. Clients who expect, and get, five-course dinners, iced drinks, and delicacies ranging from asparagus tips to Bavarian sauerkraut, give rise to not a few problems of organization. 'The Masai Story' may be recommended as a pleasantly written and interesting travel book by one who knows and loves the area about which he writes. J. M. R.

NORTH AND SOUTH AMERICA

THE CONQUEST OF MOUNT McKINLEY. By BELMORE BROWNE. *Boston: Houghton Mifflin*, 1956 (*1st edition* 1913). 8×5½ *inches;* xxx×381 *pages; maps and illustrations.* $6

Belmore Browne was America's most distinguished mountain artist and exploratory mountaineer, and 'The conquest of Mount McKinley' is America's most important mountaineering book. First printed in 1913, it graphically describes the exploration of the highest mountain in North America and its ascent to within almost a stone's throw of the summit. One of its most fascinating features is the discussion of the mountaineering work by which Browne proved that Frederick A. Cook had *not* climbed Mount McKinley. Browne's proof of the fraudulent nature of Cook's claims concerning Mount McKinley is an important sidelight on the controversy which still occasionally rages over whether or not Cook reached the North Pole before Peary—or even went near it. The foreword by Vilhjalmur Stefansson and the introduction by Bradford Washburn add to this attractive new edition of a "classic" which has long been a collector's item. R. H. B.

THE CLIMATE OF CENTRAL CANADA: Manitoba, Saskatchewan, Alberta and the districts of Mackenzie and Keewatin. By W. G. KENDREW and B. W. CURRIE. *Ottawa: Edmond Cloutier*, 1955. 9½×6½ *inches;* 194 *pages; maps and illustrations.* $1.

This Government publication is part of a series, one of its authors being the well-known authority, Mr. W. G. Kendrew. The area described embraces more than 40 per cent. of Canada, including all the Northwest Territories except the Arctic Archipelago, Alberta with the adjacent parts of British Columbia east of the Rockies, Saskatchewan and Manitoba.

The outstanding feature is the enormous continental range of temperature between winter and summer, amounting to about 70 degrees, with the brief spring and autumn periods. The mean January temperature over a large area in the east and north is below 0 degrees Fahr. with extreme minima down to −70 degrees, and the whole period when the mean temperature is under this limit is significantly distinguished

from ordinary winter as "cold" winter. The mean July temperature rises above 70 degrees near the International Boundary, with extreme maxima up to 110 degrees, though most of Central Canada is not immune from summer night frosts.

A few points call for clarification in another edition. On page 175 there occurs, no doubt through oversight, a confused statement on the winter climate of Manitoba: "The temperature may rise above 32° in all months except January (and February in the north), the average number of these thaws during the period when the mean monthly temperature is less than 32° being 7 days in January in the south, 3 days in each of December, January and February in the north, most of them in the early and late weeks of the period." On pages 70–1 there are somewhat conflicting statements as to the extent to which snow cover increases luminosity at night—an obviously interesting question in a country like Canada. On pages 60–1 we read that in the Prairies the term blizzard is used to describe any storm in which snow is raised by the wind to such heights and in such quantity as to reduce visibility in daylight to about 200 yards. It is, however, said that in such storms people in the settled areas are seldom lost because today fences, roads, telephone lines and farmsteads serve as markers. Yet presumably in the worse Prairie blizzards visibility might fall dangerously below 200 yards. In severe drifting snowstorms the combined density of falling and driven snow can easily reduce visibility almost to nil obliterating the nearest landmarks as is certainly the case sometimes in exposed mountain and moorland districts in Great Britain. L. C. W. B.

THE BARREN GROUND CARIBOU OF KEEWATIN. By FRANCIS HARPER. *Lawrence: Kansas*, 1955. (University of Kansas Museum of Natural History Miscellaneous Publication No. 6. n.p.) 8×5½ *inches;* 164 *pages; figures and maps*

This concise and well-written monograph is the fruit of an expedition made by the author in 1947 to study the Barren Ground Caribou (*Rangifer arcticus arcticus*) in the region of Nueltin Lake, in south-western Keewatin, N.W. Canada. The expedition was supported by the Arctic Institute of North America, and funds were provided by the Office of Naval Research. The results of the author's investigations have been committed to print in a model fashion, and the book forms a valuable study in the natural history of a comparatively little-known region which can be read with pleasure and profit, not only by biologists but by all who are interested in the life-history of a remarkable animal. As no other North American land mammal migrates so extensively, the first section of the book is fitly devoted to an account of these migrations. The author then passes on to the ecological study of the Caribou, particularly in its relations to man and other animals. General habits are then discussed, and there is a final section on the morphology and taxonomy of the animal, including tables of body measurements, measurements of skulls and antlers, and a note on geographical variation. A fifteen-page list of literature cited, an annotated, chronologically arranged account of bibliographical references to *Rangifer a. a.*, and a general index bring this admirable handbook to a conclusion. A. C. T.

THE INDUSTRIAL STRUCTURE OF AMERICAN CITIES. By GUNNAR ALEXANDERSSON. *London: Allen and Unwin; Stockholm: Almqvist and Wiksell*, 1956. 9½×7 *inches;* 132 *pages; maps and diagrams.* 40*s*

Until recently the functional classification of cities has been almost exclusively qualitative. Among the first to indicate a quantitative form of analysis were Dutch geographers, whose work in studying the occupational pattern of Dutch towns has been of considerable importance to regional planning. The occupational distribution of total gainfully employed in each municipality is examined and may be compared either with an ideal statistical abstract or with the national average distribution. In this manner the functional differentiation of settlements may be indicated and any imbalance or deviation from the average can be measured. The method is also helpful in indicating factors which influence the localization of industry.

The same methods were tentatively used when the author worked as assistant to Professor William-Olsson in the preparation of his "Economic Map of Europe." The present book which is based on data contained in the 1950 United States "Census of Population," is the result of the analysis of the industrial structure of all U.S. "cities" with a population exceeding 10,000. Particular stress is laid on the importance of distinguishing between those industries which provide the agglomerative or "city forming" element and those which provide services for the inhabitants.

However, the presentation of the results of this analysis are somewhat disappointing. Although there are included numerous distribution maps of employment in the various industries and of the manufacturing importance of the cities, the text gives no more than an outline of the distribution of American urban industry. In places the cursory style of writing appears misleading, as on page 64, where in discussing the apparel industry there is printed "It is in its location a ' parasite' industry which occurs in a few big cities and in towns dominated by male industries," and on page 43 where unsuitable use is made of the word "symbiosis." Some of the maps appear to have suffered as a result of reduction, and the scope of the analysis would suggest that it is deserving of more detailed interpretation. H. T.

THE TLINGIT INDIANS: Results of a trip to the Northwest Coast of America and Bering Straits. By AUREL KRAUSE, trans. by E. Gunther. *Published for the American Ethnological Society by the University of Washington Press, Seattle*, 1956. $8\frac{1}{2}\times5\frac{1}{2}$ *inches;* viii+310 *pages; illustrations.* $4.50

This is an excellent translation by a professional anthropologist of Krause's 'Die Tlinkit-Indianer' first published in 1885. It has long been out of print and the American Ethnological Society is to be congratulated for making it available again. The volume is a compilation of much of the early material, a great deal of which was in Russian and dated back to the Russian post at Sitka, plus Krause's own observations. The value of the translation is greatly enhanced by the fact that all of the original illustrations have been reproduced. M. W. S.

JOURNEY TO THE LAND OF FIRE. By JACQUES CORNET and HENRI LOCHON. Translated by Mervyn Savill. *London: Robert Hale*, 1956. 9×6 *inches;* 184 *pages; illustrations.* 16*s*

HIGHWAY OF THE SUN. By VICTOR W. VON HAGEN. *London: Victor Gollancz*, 1956. 9×6 *inches;* 257 *pages; maps and illustrations.* 18*s*

URUGUAY: Portrait of a Democracy. By RUSSELL H. FITZGIBBON. *London: George Allen and Unwin*, 1956. 9×6 *inches;* x+301 *pages; map and illustrations.* 25*s*

'Journey to the Land of Fire' is the account of two young adventurous Frenchmen who drove most of the way from Montreal to Tierra del Fuego and then returned to Paris via Rio de Janeiro, Dakar, the trans-Saharan road and Gibraltar. It is indeed "ordeal by auto," and much of the volume is taken up with the mechanical troubles (and punctures) of their baby car and the means by which these disasters were overcome. There was no objective in the journey save that of completing it, and it is a light and very uneven picture of the route taken and some of the naïve impressions of the two travellers. One cannot but admire the physical endurance of both drivers and car, but geographically the value of the book is minimal. Many facts are quite erroneous. South of 30° S. they entered the Equatorial zone; we are led to believe there are no Indian-Negro mixtures in Brazil; and the old cliché is repeated that, since the cutting of the Panama Canal, Punta Arenas is a dead city. Misprints of Spanish terms are common, and São Paolo appears thus more than a dozen times.

By contrast Victor von Hagen's 'Highway of the Sun' is without doubt one of the most fascinating and valuable books written on South America in our time. Humbolt once wrote that "the roads of the Incas were the most useful and stupendous works ever executed by man," and it is therefore most fortunate that we have been given an author so capable of doing justice to this great theme. Not only has he pro-

duced an excellent archaeological and topographical record of a great pioneer expedition which investigated the Inca road system, but he has packed into its 250 pages one of the most thrilling stories of travel and adventure, exploration and discovery which will delight both the specialist and the layman alike. If one adds to its scholarly and human interest the excellent literary quality of the text, the beautiful photographs and useful maps, it is difficult to exaggerate the superlative value of this publication. To quote the foreword: "after reading it one feels like packing a rucksack and starting to dig one of the many ruins he found along his trail."

Aided by the American Geographical Society, at times by other experts and throughout by his gallant young wife, von Hagen has fleshed the dry bones of Inca archaeology and given us, by means of historical and field research, a comprehensive view of the extent of their Empire and the teeming life of the civilization which built their roads. From Quito to Talca, "from the suffocating sands of the desert to the moonscapes of the Andes" the book traces how Man accepted none of the frontiers laid out for him by Nature and how by means of these roads he changed his cultural horizon. Human geographers will welcome this vivid story of a great civilization in the inhospitable lands of the Central Andes.

Professor Fitzgibbon's 'Uruguay' should do much to acquaint the general reader with a country relatively unknown to most English-speaking people. In almost every respect it refutes the generalization that all Latin American countries are cut to the same pattern. While covering adequately such aspects as education, journalism, and the arts, it is in the fields of history and politics that the book is most readable. Especially interesting are the stories of Uruguay's evolution as a buffer state, its internal struggles and the contributions of Batlle y Ordóñez and Varela to the integrated nation of today. The author is less happy in his descriptions of Montevideo and the interior but the geographer will welcome his analysis of the unbridged gulf between the capital and the *campo*, and the economic history on which the problem is based. The carefully selected and assessed bibliography will be a most useful guide to those wishing to obtain fuller accounts of special aspects of this small but most progressive state. G. J. B.

THE NAKED AUCAS: an Account of the Indians of Ecuador. By ROLF BLOMBERG, trans. by F. H. Lyon. *London: Allen and Unwin*, 1956. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 191 *pages; map and illustrations.* 21*s*

This popular account of a journey up the River Napo, Ecuador, has two sketch-maps and the end-papers reproduce an interesting old map of the region drawn by the Bohemian Jesuit Father Samuel Fritz. The account centres around the author's attempt to contact the Auca Indians who are said by him to be renowned for their savagery. Actually, the word *auca* is a generic term used throughout the Peruvian and Ecuadorian Montaña for pagan as contrasted to Christian Indians. The area between the Marañón, Napo, and Pastaza Rivers is occupied by Záparoan-speaking tribes, some of whom maintain a large percentage of their early habits. The anthropologist says of these people that bows were little used, wars being fought with spears, and that victims were eaten and trophy skulls taken. It is around this part of their life that Blomberg weaves his entire book. The expedition which he led was doomed to failure for it was routed by the first "Aucas" it encountered. The devotee of the more spectacular in travel books or the specialist in the area may well find the book and its pictures of interest. M. W. S.

ZOO QUEST TO GUIANA. By DAVID ATTENBOROUGH. *London: Lutterworth Press*, 1956. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 185 *pages; photographs.* 18*s*

This is the record of three months, April to June 1955, of the B.B.C.—London Zoo Expedition to British Guiana, that went for the purpose of filming animals in their natural surroundings and also bringing them back alive. The party consisted of J. Lester and T. Vinall of the London Zoo, and David Attenborough and C. Lagus

of the B.B.C. They visited the broad flat savannahs, the creeks and swamps of the Rupununi and the remote forest reserves of the Amerindians on the Mazaruni River close to the Venezuelan border. Such extensive travel in a relatively short time was made possible only by the use of aeroplanes which have now brought the remotest parts of the colony within easy reach of Georgetown. The greater part of the book is devoted to the collecting of animals, a certain number of which were acquired from the local inhabitants who keep an astonishing variety of pets, ranging from small birds such as parrakeets up to macaws and such mammals as capybara, coatimundi and monkeys. However, most of the reptiles and many of the mammals and birds had to be caught by members of the expedition, and there are entertaining stories about the animals collected, ending in their attempts to find a manatee, eventually captured in a pond in the outskirts of New Amsterdam. It may be recalled that some of the animals collected during this expedition were exhibited in the Society's house last Christmas as part of the exhibition "Putting animals on the map."

The author attended the exorcising of a spirit by a medicine man and obtained tape records of the strange noises accompanying the ceremony which was carried out in complete darkness. They also obtained photographs of ancient Indian rock paintings on a cliff, near the Karowrieng, one of the smaller tributaries of the Mazaruni. Few white people have ever seen these American cliff paintings which stretch for 40 or 50 yards along the base of the cliff and rise to a height of 30 or 40 feet. The designs were crude but many clearly represent animals and there are boldly painted symbols such as squares, zigzags and strings of lozenges. Interspersed between them are hundreds of hand prints all in the same red paint as was used for the paintings. The photographs and plates illustrating the text are of a very high quality, and the book can be thoroughly recommended as a popular and entertaining account of the inhabitants and life of a little-known region of South America. E. H.

AUSTRALIA AND NEW ZEALAND

TRACK OF THE YEARS. The story of St. Arnaud. By YVONNE S. PALMER. *Melbourne University Press*, 1955; *London and New York: Cambridge University Press*, 1956. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 308 *pages; illustrations.* 30*s*

This book tells the story of St. Arnaud, a small country town in the Wimmera district of north-western Victoria that came into being a century ago at the time of the New Bendigo gold rush. St. Arnaud is not a ghost town that had a sudden feverish and ephemeral existence. It began rather with a small number of miners and traders who stayed on after the first gold diggings and worked for the development of the quartz reefs and the silver that was also discovered later. By 1870 the population had reached about 1300, the main street was metalled for most of its length, and the first rough shacks of bark and slab were being replaced by weatherboard shops and houses. Pastoral occupation of the Wimmera by squatters with extensive sheep-runs had preceded the birth of the mining township but by the late '60s and '70s the sheep-runs were being parcelled out into wheat farms. The '70s saw the establishment of flour mills at St. Arnaud and the coming of the railway. Mining has since died out and where once the landmarks of the settlement were the headgear and chimney stacks of the mines, today they are the silos of flour mills.

The establishment of various institutions, such as the churches, school, mechanics' institute, hospital and cinema that serve the local inhabitants and the wheat farmers of the surrounding district, are all carefully dealt with. The story here unfolded of a particular small country town must be typical of many others in Australia and as such it is of considerable interest to geographers. It is to be regretted however, that being concerned almost entirely with the past, with the process of becoming, the book leaves the reader with no very clear picture of the town of 3000 people that exists today. Writing primarily for the local inhabitants celebrating the centenary of the town, the author apparently did not consider it necessary to include among the illustrations any

map to show the precise layout of the present-day town or any contemporary photographs to depict features of its townscape. It goes without saying that such omissions must seriously limit the value of the study. A. E. S.

NEW ZEALAND GEOMORPHOLOGY. By C. A. COTTON. *Wellington: New Zealand University Press*, 1955. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 281 *pages; maps, illustrations.* £(*N.Z.*) 2.2

This volume contains sixteen papers written by Professor Cotton when he was a young man in his twenties and thirties and originally published in various journals in New Zealand, Holland, America and Britain. Its publication was undertaken by the Victoria University College, as its Principal explains in a foreword, "as a mark of its gratitude to and pride in one of its most distinguished members, whose research and writings have brought it credit," and it provides at once a very appropriate tribute to a great field scientist and a valuable addition to the literature of geomorphology. Reading this collection of virtually unknown papers workers of today must admire equally the grasp which this young New Zealander had attained in his antipodean solitude of the principles worked out by Powell, Gilbert and Davis, and the success with which he applied them to the description of New Zealand land forms and the elucidation of the later phases of New Zealand geological history.

Not unnaturally this is a rather difficult book to read. The arrangement of the papers in strict chronological order may expose "the formative stage of the author's thinking" but, since Professor Cotton worked simultaneously on both regional and local problems, it leads to an arrangement which is both disorderly and repetitive. British readers would be well advised to follow what may be regarded as the major theme, the tectonic origin of the main relief features of New Zealand, and begin with Chapter 7 "The Structure and Later Geological History of New Zealand" (1916), which is really Professor Cotton's own summary of his D.Sc. thesis of 1914. Chapters 3 on "The Physiography of the Middle Clarence Valley" (1913), 8 on "Block Mountains . . . in Northern Nelson" (1916), and 9 on "Block Mountains in New Zealand" (1917), are the most valuable in the book and provide the observational basis and working out of these views. Chapters 10 and 13 are pendants of these, while Chapter 16 with its twenty-one text figures is a masterly summary of the whole discussion (1925) which should be recommended reading for all members of Honours Schools of Geography, just as Chapter 12 "Mountains" should be part of the education of all geologists. The remaining chapters are of more local interest, 1; 2, 6, 14 and 15 dealing (as have many later papers from Professor Cotton's pen) with the immediate environs of Wellington, 11 with the coastal plain a little further north, and 4 and 5 with the Marlborough coast immediately across Cook Strait.

The original text has been amplified in two ways, by the inclusion of sixteen pages of fine photographs with appropriate references to them in the text, and by the addition of footnotes indicating that different views have since been reached by other workers or by Professor Cotton himself. Occasional verbal emendations have been enclosed in square brackets, and younger workers are recommended to note the significant insertion in the phrase "The conclusion seems [almost] inevitable that . . ." dictated by second thoughts after the lapse of thirty years. D. L. L.

PHYSICAL GEOGRAPHY

VOCABULAIRE FRANCO-ANGLO-ALLEMAND DE GÉOMORPHOLOGIE. By HENRI BAULIG. *Paris: Société d'Édition, Les Belles Lettres*, 1956. $9\frac{1}{2} \times 6\frac{1}{2}$ *inches;* 230 *pages.* 800 *frs.*

The English-speaking world owes much to Professor Baulig for his past contributions to the science of geomorphology. Once more we are in his debt, for the vocabulary which he has now produced should do much to make the work of French, British, American and German scholars mutually intelligible. The terms defined cover a wide

field and all interested in the earth's surface, whether geographer, geologist, hydrologist or pedologist will find this book of great assistance.

In the valuable introductory chapters the author states that science does not describe for descriptions sake, but in order to explain. The core of the book follows this principle closely; each structure, process and landform is explained in clear French and the geomorphological terms are given in French, English and German. The third section is a very full index in three languages.

A book of this kind raises many questions to which there are no clear-cut answers. Baulig clearly has his own ideas as to what constitutes acceptable terminology and he expresses adverse judgment on occasion by placing an exclamation mark after the offending word. On the other hand, he commends the use of Kirk Bryan's inventions in the field of cryopedology, such as congeliturbation. The extra wide margins can be used for recording differences of opinion or alternative terms, and will no doubt be used to add *rift* or *rift-valley* to the English equivalents of *fosse* or *graben*, and to correct the impression that all *rift-valleys* are *ramp-valleys* (Bailey Willis), *i.e.* due to compression (464). We, for our part, might with advantage heed this Frenchman's plea and refrain from using the word *talus* when we have a word, *scree*, which says correctly and in English what is meant. *Talus slope* does sound rather ridiculous in French or in English if both words are expressed in the same language.

Great developments have taken place in French and German geomorphology since 1945, particularly in the field of "climatic geomorphology"; this book should make this more easily read and understood. At the same time, it is to be hoped that works written in English will also receive wider recognition on the Continent. E. H. B.

SURVEY AND CARTOGRAPHY

HYDROGRAPHIC SURVEYING: for development and conservancy. By Lieut-Cmdr. A. D. MARGRETT, R.D., R.N.R. *London: Kelvin-Hughes (Marine) Limited*, 1955. 11×8½ *inches; 67 pages; diagrams*

Many problems in coastal and harbour engineering would be more approachable if accurate surveys were made at regular intervals, and this handbook sets forth the essentials of theory and practice so attractively that it may start busy men looking round for suitable landmarks. The author has had long experience with a small survey team and, expecting his readers to know how to operate a plane table, level, theodolite and station pointer, he concentrates on the practical details which arise in surveys of harbours and estuaries. Where more information may help he refers his readers to the Admiralty Manual of Hydrographic Surveying and other standard works.

He devotes rather more space to the echo sounder, claiming that it is unsurpassed in accuracy if used intelligently and with due regard to its limitations. A concise account is given of the necessary adjustments, calibrations, checks, interpretation of records and routine maintenance. It shows under what particular conditions the width of the sound beam and slope of the bottom might lead to errors in interpretation. The two direct methods of checking the measurements, by sounding on to a bar lowered to a measured depth below the boat and by checking bottom soundings with a lead line, seem likely to give better results than the alternative of calculating the velocity of sound from thermometer and hydrometer readings, but it is useful to encourage a better understanding of how the velocity of sound, which is the standard of the depth measurement, is likely to vary with temperature and the properties of fresh and salt water. A final chapter deals very adequately with current measurements, sweeping for obstructions and bottom sampling. G. E. R. D.

TOPOGRAPHICAL MAPS AND PHOTOGRAPHIC INTERPRETATION. By P. T. SILLEY. *London: George Philip*, 1956. 9½×7 *inches; 59 pages; maps and photographs.* 10*s* 6*d*

This little book contains an introductory course on map-reading for schools, training

corps, and students reading for preliminary professional examinations. It may be described briefly as a set of reproductions of air-photographs and portions of maps, preceded by eleven short chapters of notes on scales, grids, conventional signs, and other cartographical matter, with good illustrative diagrams. There are also some notes on the maps, and three pages of examination questions.

The most valuable part of the book is that consisting of eight oblique air-photographs bound opposite to maps showing the same areas. These pictures and maps are well chosen, and they vividly illustrate the relation of country to map in a way that cannot fail to stimulate the interest of any reader.

There is room for improvement, however, in the eleven chapters, which give a general impression of scrappiness and hasty writing. For examples, "the projection of part of a spherical surface on a plane is not possible" (Introduction), "pictures taken at low altitudes are called low obliques" (Chapter 9), and the treatment of bearings in Chapter 4, are likely to confuse the uninitiated. It is not clear, in some places, whether the author is discussing a general proposition or referring to a particular map.

Defects of this kind are easily put right in another edition, and it is to be hoped that there will be continued demand for this type of book, because the idea behind it is an excellent one. Schools will always need these vivid, up-to-date, and simple presentations of important subjects. The printing and production of the book are of pleasing quality, and only one misprint was noticed. J. E. J.

ECONOMIC GEOGRAPHY

GÉOGRAPHIE DE LA CIRCULATION AÉRIENNE. By EUGÈNE PÉPIN. *Paris: Gallimard*, 1956. $8\frac{1}{2} \times 5$ *inches;* 341 *pages; photographs, maps, diagrams. fr.* 1200

This book falls into three parts. The first is a balanced history of air traffic rightly devoting more space to recent developments. Part 2, "Liberty and Security of air traffic," discusses legal and political topics such as the ownership of the atmosphere, international flying, and forbidden zones, and then under "Security on the ground and in the air" covers points such as lengths of runways for different types of plane, air port layout and surroundings, meteorological organization, cartographic provisions and the three-dimensional control zones around the airport. Part 3 is mainly a detailed factual account of air lines throughout the world. This is a very useful and interesting source of information and the book should prove valuable to geographers. Its weakness lies in the somewhat unjustified claim to be the geographical member of a proposed trilogy on air traffic. It is far too barren of geographical explanation or correlative material, and many interesting questions are not even asked. Why for example has Australian freight tonnage increased so disproportionately to passenger traffic as compared with Africa? Had the author expressed his statistical material as graphs, many of these trends would have been manifest. More comparative analysis, and the use of specific examples to illustrate the principles of Part 2 would have enhanced this text as a work of geography. A. C.

WORLD SEA FISHERIES. By ROBERT MORGAN. *London: Methuen*, 1956. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xiv + 307 *pages; maps and illustrations.* 30*s*

Reports on world sea fisheries are usually written by biologists. Dr. Morgan is an economic geographer with a good grasp of the physical and biological backgrounds to the distribution of fishes and fishermen. Within the 300 pages of this book he has given a well-balanced appreciation of the main fisheries in the ocean. The illustrations are simple but effective and there are useful references and statistics.

The book is divided into three parts. The first sets the scene by being an account of the physical environment. Plankton and fish production are considered and there is an important and interesting chapter on the influence of coastal features on the development of fisheries.

The second section is concerned with techniques. Dr. Morgan's opening remarks are apt: "The fishing vessel, with its equipment, forms an instrument evolved to fulfil a function as efficiently as the knowledge of its builders permits. Though purely utilitarian, it often has beauty. This can perhaps be said of most devices of man constructed to deal directly with the forces of nature. They are obliged to achieve a harmony and balance of form reflecting that of nature herself." Fishing methods are dealt with in a systematic way, demersal and pelagic fisheries having separate chapters. Consideration of processing and transport methods and fishing communities and ports, complete this section.

The remaining part on fisheries takes up half the book. The Asian regions, with a fisheries output (13 million tons a year) equal to about half the world figure, are dealt with first. Much of the Asian catch is obtained by small concerns using rather primitive equipment. Then follow accounts of fisheries in other parts of the world, where some techniques are used that might well be applied in parts of Asia and Africa. The final chapter on changing aspects of fisheries is rather short for so important an aspect. The seas will need to be used to best advantage to help to feed expanding populations. As, Dr. Morgan concludes, we can ". . . no longer afford to neglect such major resources." N. B. M.

GEOGRAPHICAL FEATURES OF THE AUTOMATION OF INDUSTRY. By DAVID G. OSBORN. *University of Chicago, Department of Geography: Research Paper No. 30: Chicago, Illinois*, 1953. *Planographed*, 6×9 *inches;* xiv+106 *pages; maps and illustrations.* $3.00

In the United Kingdom, automation has become front page news only during recent months. It is not however as new a feature of American life and the tranquility with which its progress has been viewed in the United States is mirrored in a recent doctoral study of the University of Chicago. Its author, Dr. David Osborn, describes his thesis as a pioneer study in a new field and it is for its suggestive rather than its conclusive merits that it must commend itself to English geographers. Automation is defined here as automatic operation and control and as such it climaxes an age-old trend towards increasing mechanization. The recent acceleration in its application stems from the increased research in electronics accompanying the Second World War and already its extension into the field of industry is producing significant changes in the technology and economics of production. Osborn selects some twelve automated units for intensive study, drawing mainly from the American manufacturing belt and ranging in scope from chemical plants to marshalling yards. One impressive case he analyses is the disputed erection of a coal and iron-ore conveyor belt between the Lake Erie shore and the steel centre at Youngstown, 100 miles inland. In each example the author has been meticulous in securing authoritative and comparable data and has not allowed his obvious interest in the automation process *per se* to outrun his analysis of its geographical impact.

The overall conclusion from the study is that automation must loosen the ties of both land and labour as locational forces. In the industrial cases examined automation had reduced labour and floor-space requirements by amounts ranging from 12 to over 90 per cent. Granted that the sample was a small one, the direction of this trend is unchallenged. Osborn, however, is cautious in reading much from his results. He points out that he recorded no actual shifts in location directly resulting from automation, and that in much of industry the cuts in land and labour requirements will have little or no effect. Even in industries directly affected, while automated processes may make it possible for a factory to move "right into the orchards" other considerations such as capital cost of re-locating may make it more profitable not to move at all.

Automation may, it seems from this study, promote inertia rather than mobility. In the present highly industrialized areas the standard of servicing for the intricate automation controls will foster further automation, in contrast to areas of low industrial density which look like being caught in a spiral of low demand—poor servicing—

retarded automation. The contrast is likely to be reinforced by the prior automation of transport and power facilities in the existing areas of most acute demand—again, the present manufacturing areas. Within cities the centrifugal trend in factory siting may be arrested by the trend to labour and floor-space cuts, enabling firms to maintain efficient operation in existing down-town locations rather than be forced out to the suburban fringe. The significance of these findings are of more than local interest. Automation is one of the most fundamental trends in the new industrial revolution and economic geographers will welcome this prophetic introduction. Most important perhaps are the unanswered questions in the thesis which may prompt others to follow the trail Dr. Osborn has so courageously blazed. P. H.

HISTORY AND BIOGRAPHY

THE ROANOKE VOYAGES, 1584–1590. Edited by D. B. QUINN. Works issued by the Hakluyt Soc., 2nd ser. CIV and CV. *London: Hakluyt Society*, 1955. 8×5 *inches;* 1004 *pages; maps and illustrations.* 120*s*

Professor Quinn's study of the Roanoke Voyages (as he terms those sponsored by Sir Walter Raleigh between 1584 and 1590) follows naturally upon his earlier volumes about the colonial enterprises of Sir Humfrey Gilbert. Both stories are stories of tragic failure, and as such get scant notice in general histories, which may account for the fact that many people believe that Sir Walter Raleigh went to Virginia himself. But his personal appearances in these detailed records are limited to a brief note to his half-brother, Sir John Gilbert, and a passing reference in his 'History of the World.' What he did was to put down a very considerable sum of money, focus upon himself a remarkable volume of propaganda literature for planting in America, and send out his personal scientific adviser Thomas Hariot. Hariot's 'Brief Report' is justly famous as the first reliable description of that part of the world, but his general narrative of the 1585 voyage is lost, and there is a lamentable lack of "behind the scenes" documents.

For if the adventure is rich in romance—a first English baby is born on American soil—it is also rich in mysteries. The reconnaissance voyage of 1584 is enthusiastically reported, but from another quarter comes a hint of tragedy. Rafe Lane, "a gentleman of good account" is appointed governor, but he quarrels bitterly with Sir Richard Grenville. He writes flowery letters home to Sir Francis Walsingham and others, but the well-born colonists depart pell-mell when Drake's ship calls in 1586. The anxieties and austerities of life in the wilderness seemingly proved too much for them. Raleigh's supply ship found them gone, and Grenville's second large and well-manned ship merely left a tiny holding party behind. Meanwhile a second group of settlers was being assembled in England under the leadership of John White. Who, exactly, was John White? His twelve named Assistants (including his son-in-law) are described by the College of Arms as "gentlemen of London," but are all otherwise unknown. All, that is to say, save one—the truculent Portuguese pilot-major, Simon Ferdinando, the erstwhile pirate who had become "Mr. Secretary Walsingham's man," and no doubt kept his master well informed. That John White had originally gone to Virginia as surveyor and painter was not, of course, inconsistent with gentle birth. In the citation of the Arms granted to him as Governor we read: "In the first feeld (for a Reward) Ermyn, on A Canton gules, a Fuzell Argent. In the second (for his owne Ancyent Cote, by the name of White) A Cheveron betwene three Goates heads razed sables." But apparently nothing can be learned from this. All the Assistants were granted Arms, for they were to found and govern the City of Raleigh on Chesapeake Bay. Actually they never got beyond Roanoke, Ferdinando saw to that, for White was no forceful soldier, practised in beating down a bullying opponent. Nor did he succeed in bringing out the first supplies for which he went home. Not until 1590 did he reach Virginia again—as an unwanted passenger on a reluctant

voyage, allowed to ship nothing beyond his sea-chest. The colonists had vanished. Their fate remains unknown.

Professor Quinn, as a disinterested historian, wastes no tears upon them. He assembles all the documents and links them by a masterly narrative, adding besides a wealth of technical notes. One long section is devoted to Spanish documents (in translation), for the English activities did not escape the notice of her enemy. As seen in retrospect the time was perhaps ill-chosen for planting a civil colony. The foundations of the little fort put up in 1585 have recently been excavated by American archaeologists, and Professor Quinn gives us their report, while he has also obtained from specialists linguistic notes on Indian words and place-names. In a further appendix is a catalogue of White's drawings and their derivates, rightly treated as historical documents, while of special interest to geographers is the examination of the surveyor's maps as engraved by de Bry. A large-scale modern map has been over-printed with the sixteenth-century outlines and place-names, and brings out clearly some coastal changes, which were to be expected. Professor Quinn also reproduces a rough sketch-map, hitherto wrongly dated, which he is able to ascribe to 1585. Both White and Hariot were probably well furnished with instruments, if we may judge from the instructions issued two or three years earlier for a surveyor who was to accompany Gilbert. These instructions were discovered by Professor Quinn among Sir Thomas Hoby's papers, so that it is just possible (as he would readily admit) that these two fascinating volumes do not say absolutely the last word on the lost colonists.

But was it piety or heartlessness that made the father and grandfather of Eleanor and Virginia Dare so soon content to commit their relief with the rest of his "discomfortable company the planters in Virginia" to "the merciful help of the Almighty," and settle down in his house in Ireland, whence he wrote to Richard Hakluyt in 1593?

E. G. R. T.

ROBERT HOOKE. By MARGARET 'ESPINASSE. *London: Heinemann*, 1956. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* ix+92 *pages; illustrations.* 21*s*

Mrs. 'Espinasse is not herself a scientist, but she was moved to write this fascinating life of Robert Hooke for the best of reasons—she was enchanted by the personality which emerged from his private diaries, especially the earliest one first published in 1935. In that diary, never meant for others' reading, the writer's complete and absolute devotion to science is revealed unmistakably, and as his biographer says: "He never appeared to doubt the validity of his aims, the value of his standards. Under his distresses and crosses he gives the impression of a man integrated, composed, at peace with himself." Sympathy with the subject of a biography, although essential to success, is not, of course, sufficient in itself, and Mrs. 'Espinasse has worked in very close cooperation with many scientists, including her husband and Dr. J. Bronowski. The latter is general editor of the 'Contemporary Science Series' in which this book appears, and gave the author particular help in elucidating contemporary scientific attitudes, and more especially those of the eighteenth century which led to the neglect of Hooke and the almost deification of Isaac Newton. The two men (who were at odds during their lives) came to represent two major aspects of science, the applied and the "pure," the one dependent on instruments, apparatus and experiments, the other on logic, on intellectual reasoning. It is needless to say which was extolled in the literary and academic worlds, once Newton's amazing synthesis became part of general knowledge, and which aspect therefore decided the general climate of thought. Only recently has the situation changed. And even in the seventeenth century at a time when Newton was still unknown, the new experimental studies were found disgusting by many. Mrs. 'Espinasse tells us of the outburst by the Oxford Public Orator upon the publication of Hooke's 'Micrographia,' and of Shadwell's skit upon the scientists, based on the same work, in 'The Virtuoso.' "Damnd doggs. *Vindica me Deus*. People almost pointed," wrote Hooke in his

diary after visiting the playhouse. Several of the splendid engravings from this book on microscopy are here reproduced, including the famous one of a magnified louse holding a human hair, and there are other groups of illustrations which deal with this versatile man's contributions to horology and to architecture. Nor are 'Hooke's Law' and his universal joint forgotten.

After the opening general chapters on scientific thought, Hooke's work is grouped under three headings, work in the '60's, the Cutlerian Lectures, and Hooke as Surveyor and Architect after the Great Fire. Then follows a picture of his "Social Life," and finally of his "Personal and Domestic Life," for which there is rich material in the diaries. Notes and references are grouped under chapter headings at the end of the book. The carefully prepared bibliography includes the long titles of all Hooke's published works (save for his many contributions to the *Philosophical Transactions*) and in addition a full list of the titles of papers which, as editor, he printed in his *Philosophical Collections* (1679–82), since these volumes are rare and consequently little known.

The extraordinary breadth and versatility of Hooke's mind and genius made him an ideal Curator of Experiments for the young Royal Society, the members of which were often inspired by a general curiosity rather than by any love of sustained research or scientific discipline. Many of their earlier projects were incapable of success, among them the collection of knowledge by means of questionnaires. But those which Hooke drew up to be given to travellers and seamen reveal how "modern" and farseeing were his views on geography and meteorology, a fact which emerges, too, from his schemes for Moses Pitt's 'English Atlas.'

The late Dr. R. T. Gunther printed Hooke's later diaries (1688–92) in his invaluable 'Early Science in Oxford' before the earlier one (1672–1684) had been examined. For the latter Mrs. 'Espinasse has gone to the original manuscript at the Guildhall, since owing to the difficulty of transcription the published version is not entirely satisfactory. But from it the following quotation will sugggest its flavour:

"1672 Sept. 1. Drank Steel Benummd my head. Somewhat hotter all day. Eat milk. Saw Mr. Wild at Garways (a Coffee House). Calculated [focal] length of glasses. Mr. [Jonas] Moor here. I invented an easy way for a musick cylinder with pewter tipes pinched between cylindrick rings. Slept ill all night and observed Mars with speculum [his reflecting telescope], but not so good.

"Sept. 2. Grace [his beloved niece] went to school after dinner. At Mr. Hauxes. Home. At Dr. Godderds, tasted tinture of wormwood. . . . Made instrument for eclipse of starrs by the Moon. Eat raw milk, wrapd head warm and slept well after."

E. G. R. T.

GENERAL

A GEOGRAPHER'S REFERENCE BOOK. Edited by C. H. SAXELBY. *Sheffield: Geographical Association, Geographical Handbook Committee,* 1955. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches; 222 pages; maps*

This valuable book, while published by the Geographical Handbook Committee and distributed by the Geographical Association, primarily owes its appearance to the faith, enthusiasm and hard work of its editor. Professor Fleure has written a helpful foreword and other members of the committee have contributed the various sections of the book. As the editor says, it was originally conceived as a Year Book and its special character and contribution lie in the way in which it brings together a wide variety of information about geographers (in universities and training colleges), societies and institutions of importance to the geographer, sources of statistics, reference books and about important recent developments in the exploitation of the world's resources. It is perhaps the short section on geography teaching which, while sound and interesting, is the one less in line with the character of the remainder as a reference book and which deals with subject matter already well covered by publica-

tions likely to be familiar to the professional geographer. It is helpful to have in one compass the names of the staffs of the geography departments of universities and training colleges, details of entrance requirements for degree courses and similar information. The exhaustive lists, with addresses, publication dates and so on, under other headings will be found invaluable for reference. About half the book is devoted to "Some new developments in world resources," a factual review contributed by Dr. Wise and Mr. W. R. Ellis which should prove of great value to teachers of geography, for whom the problem of keeping their teaching up to date is a considerable one. Details and a map are given for example of the Owen Falls hydro-electric power scheme in Uganda and the up-to-date picture of petroleum production, with particulars, for example, of Middle East pipe-lines constructed since the war, is one which is relevant and valuable in many contexts. The editor and his team are to be congratulated on the successful completion of a worthwhile project.

E. W. H. B.

CITIES AND MEN: AN AUTOBIOGRAPHY. Vol. 3 1924–1954. By Sir HARRY LUKE. *London: Bles*, 1956. 9 × 5½ *inches; 254 pages; illustrations.* 25*s*

In this record of his Colonial office and British Council service between 1924 and 1954, Sir Harry Luke provides a further entertaining and varied instalment of his autobiography, of which two volumes have already appeared. As a highly skilled and even professional writer (the Society's library has eighteen of his books and as many magazine articles), Sir Harry gives a brilliant picture of diplomacy and travel from Petra to Patagonia and the Pacific, interspersed with many shrewd comments, anecdotes, vivid descriptions (Machu Pichu as seen by Sir Harry is particularly striking) and brisk extracts from his private diaries. Throughout, it is the variety of Sir Harry's life which amazes: he is interested in Ommayed architecture, English loan words in other languages, the Alakaluf of the Straits of Magellan, cooking and the operas of Richard Strauss as much as he is in politics and administration: yet Sir Harry's modest account of his diplomatic triumphs in the Anglo-French Condominium of 1940 makes it clear that he was always primarily concerned with his job. D. W.

THE SOCIETY'S NEWS

APPLICATIONS FOR GRANTS FOR EXPLORATION AND RESEARCH, 1957

Applications for grants must reach the Director and Secretary not later than 1 March 1957; it is only in very exceptional circumstances that late applications can be considered. Applications must be made on the Society's own form which can be obtained on request; they must be accompanied by evidence of support from institutions or qualified individuals supporting the proposed expedition or research. All applications must be typed. Leaders of expeditions and other applicants for grants may be expected to attend an interviewing board.

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY RESEARCH MEDAL, 1956

The Royal Scottish Geographical Society has announced the award of their Research Medal for 1956 to Mr. G. R. Crone, Librarian and Map Curator of our Society, in recognition of his work in the field of cartography and on the history of geography.

VISIT OF GEOGRAPHERS FROM U.S.S.R. AND POLAND

A party of five Soviet geographers, led by Academician I. P. Gerasimov and Professor S. V. Kalesnik, visited the Society's house on July 14, en route to Rio de Janeiro for the 18th International Geographical Congress. The party was received by the President, General Sir James Marshall-Cornwall, and by the Director and Secretary, Mr. L. P. Kirwan. Academician Gerasimov, who is a Vice-president of the All-Union Geographical Society of the U.S.S.R., is Director of the Geographical Institute of the Academy of Sciences of the U.S.S.R., and is a distinguished geomorphologist. Professor Kalesnik, a Corresponding Member of the Academy of Sciences of the U.S.S.R., is a Vice-president and member of the Science Council of the All-Union Geographical Society of which he was formerly Secretary. The other members of the party were Professor Formosov, the naturalist, Assistant Professor Liakhov, and Assistant M. Gornung who is a specialist in the geography of North Africa.

Professor M. Klimaszewski, a Vice-rector of the Jagiellon University, Cracow, and head of the faculty of geography there, visited the Society's house on two occasions during a fortnight's visit to this country in June. Professor Kilmaszewski is in charge of the forthcoming geomorphological and hydrographical map of Poland. The Deputy Director for Scientific Affairs of the Institute of Geography in the Polish Academy of Sciences, Professor Jerzy Kostrowicki, visited the Society's house while attending a conference on regional planning in London in October, and has contributed the paper on post-war developments in Polish geography, published on pp. 441–50 of this *Journal*.

These visits were much welcomed by the Society and, as regards the U.S.S.R., this was the first visit of Russian geographers since the war. It is hoped that Academician Gerasimov will return to this country next May to lecture to the Society on geomorphological studies.

THE TRANS-ANTARCTIC EXPEDITION

The *Magga Dan*, the Trans-Antarctic expedition ship, which is also being shared with the Royal Society expedition to Halley Bay, left the Port of London on November 15 for the Antarctic. On November 13, the ship was visited by Her Majesty The Queen; and on the same evening, a reception was given at the Royal Geographical Society by Marshal of the R.A.F. Sir John Slessor and members of the General

The Trans-Antarctic Expedition's ship, which left London for the Weddell Sea, 15 November 1956

committee of the expedition to enable those, in many walks of life, who have helped the expedition, to meet the expedition members.

Dr. Fuchs and his party hope to reach the Royal Society base at Halley Bay early in January. While the ship is discharging Royal Society stores, the Trans-Antarctic expedition Otter aircraft will be built and flown down to the expedition's base at Shackleton, thus providing air reconnaissance ahead of the ship. An Auster aircraft will also be carried on the *Magga Dan*, and will be assembled and tested at South Georgia.

On the expedition's arrival at Shackleton, the mountain range discovered last year will again be reconnoitred by air, and one of the principal objectives in the coming season's work will be to establish an ice cap station 300 miles south of Shackleton, to be manned by three men occupied with glaciological and meteorological work, and with studies of crystal orientation. Included in the expedition's equipment will be American built "Sno-cats," and Weasels fitted with cabs; a Canadian Muskeg tractor is to be used for unloading very heavy equipment so as to save the expedition vehicles for the Trans-continental Journey. All expedition vehicles and both aircraft have been fitted with "Sarah," enabling the aircraft to "home" on to any vehicles when in the field. For the Trans-continental Journey, which will not take place until 1957–58, the expedition will have the use of photographs taken by United States Navy aircraft in 1955 over the projected trans-continental route to within 100 miles of Shackleton. (See *Geogr. J.* **122** (1956) 128.)

The scientific programme for the Expedition has now been fully planned and will include a seismic and gravity traverse across the Continent. An ambitious glaciological programme is envisaged as well as meteorological and visual auroral observations. A United States base in connection with the International Geophysical Year will probably also be established on the Weddell Sea coast within 25 miles of Shackleton, and the scientific work which will be carried out will fit in with the scientific programme of the Trans-Antarctic expedition. Early next year the Ross Sea base of the Trans-Antarctic expedition will be set up by the New Zealand component of the expedition, under the leadership of Sir Edmund Hillary.

GEOGRAPHICAL ESSAY PRIZE, 1957

The examiners have not recommended to the Council any award of the essay prize for this year. A prize of £10 is offered for the forthcoming year for the best geographical essay not exceeding 5000 words in length, including sketch-maps and diagrams, written by a student reading geography at a university in Great Britain or Northern Ireland during the academic year in which the essay is submitted. The closing date for entries is 15 June 1957, and the Council reserves the right to publish or to retain for the Library any of the essays received.

GENERAL CERTIFICATE OF EDUCATION: GEOGRAPHY PRIZES

The Council of the Society, on the advice of the Education Committee, has decided to offer prizes each year for geography based on results in the General Certificate of Education summer examinations. One prize of £5 is offered for the best candidate at Advanced and Scholarship levels in each examining group. The Council hopes that these prizes will encourage candidates to offer geography in the G.C.E. examinations and improve the status of geography in the school curriculum. The awards have been made for 1956 on the recommendations of the respective Boards of Examiners as follows: *Joint Matriculation Board, Manchester:* Raymond H .Overton, Saltley Grammar School, Birmingham. *Oxford and Cambridge Schools Examination Board:* (Mr.) K. N. Jones, Ellesmere College, Ellesmere, Shropshire. *University of Bristol School Examination Board:* Eileen Margaret Gale, Merrywood Grammar School for Girls, Bristol. *Oxford Local Examinations:* Cathrine Rosalind Ruth Layzell, Rye Grammar School, Rye. *University of London School Examinations Council:* Geoffrey William Mortimore, Chatham House Grammar School, Ramsgate, Kent. *University*

of Durham School Examinations Board: Michael E. Hurst, Queen Elizabeth Grammar School for Boys, Darlington, Co. Durham. *University of Cambridge Local Examinations Syndicate:* David G. Browning, Buckhurst Hill County High School, Essex. *Welsh Joint Education Committee:* Michael Thomas Williams, Queen Elizabeth Grammar School for Boys, Carmarthen.

THE RECORD

CONTRIBUTORS TO THIS ISSUE OF THE *JOURNAL*

Dr. J. C. Beaglehole Senior research fellow of Victoria University College, Wellington, has for some years been engaged on the study of Cook, and the exploration of the Pacific; he is editing the Hakluyt Society's edition of Cook's Journals. *Professor O. H. K. Spate* holds the Chair of Geography in the National University, Canberra. *Professor Jerzy Kostrowicki* is the Deputy Director for Scientific Affairs of the Institute of Geography in the Polish Academy of Sciences, and visited the Society's house while in London earlier this year. *Professor N. E. Odell* has been until recently Professor of Geology at the University of Otago, Dunedin; Professor Odell, a distinguished mountaineer, was a member of the 1924 and 1938 Everest expeditions. *Dr. Richard H. Fleming* is Chairman of the Department of Oceanography, University of Washington, Seattle, Washington. *Dr. F. E. Elliott*, a Fellow of the Society, is Head of the Department of Geography, Butler University, Indianapolis, Indiana. *Miss Hilary Chew* has specialized in research on the post-war agricultural geography of England and Wales, and has held appointments in the geography departments of the Universities of Hull and of Liverpool. *Dr. Victor Petrov*, who lived in China for thirty-three years, has been since 1946 Associate Professor of the United States Navy Postgraduate System, Washington, D.C. *Mrs. Joy Adamson* is the wife of the Senior Game Ranger of the Northern Province of Kenya. *Professor R. F. Peel*, Professor of Geography in the University of Leeds, was awarded the Society's Cuthbert Peek grant in 1950.

UNIVERSITY NEWS

DEPARTMENT OF GEOGRAPHY, UNIVERSITY OF KHARTOUM, SUDAN

The foundation of the University of Khartoum on 24 July 1956 marked a further stage in educational progress, foreseen by Kitchener when he appealed, after the Battle of Omdurman, for funds to build a school in memory of Gordon. Geography was included in the curriculum of the Gordon Memorial School, and also in that of the post-secondary School of Arts, founded in 1937, to which Mr. R. A. Hodgkin, M.A. (Oxon.) was appointed as tutor. In 1946, the School of Arts, and similar schools of science, law, engineering and agriculture, were amalgamated into the Gordon Memorial College, which entered into special relationship with the University of London, and in 1951 was united with the Kitchener School of Medicine to form the University College of Khartoum.

From 1946 to 1953, the Department of Geography was directed by E. J. Howell, M.SC. (Wales), PH.D. (Lond.), assisted by K. M. Barbour, M.A., B.LITT. (Oxon.), who studied the forms of peasant agriculture in the central zone of the country and, latterly, the problems of mapping census data. Mr. Barbour is also writing a book on the country as a whole. When Dr. Howell retired in 1953, the headship of the department was given the status of a chair, to which J. H. G. Lebon, B.SC.(Econ.), PH.D. (Lond.) was appointed. Since his arrival in Khartoum, the present Head has continued work on 'Iraq and the Middle East generally, begun in Baghdad, and has also studied rural water supplies and land use in Sudan.

The lecturers now number six. Hassan Ibrahim Hassan, M.A. (Birm.), is at present at University College, London, as a Research Fellow, studying problems of Nile Control. Ahmed el-Sayed Osman, M.A. (St. Andrews), has been investigating agricultural problems in the Northern Province, and became a Research Fellow at the University of Durham in October 1956. Abd el-Rahman el-Nasri, B.A. (Cantab.), joined the Department in 1955, with Mr. H. R. J. Davies, B.A. (Oxon.), who is examining the area in the Blue Nile valley near Roseires which will be affected by the next large irrigation scheme in Sudan. Mr. J. R. Randell, B.A. (Brit. Columbia), M.A. (Lond.), was appointed to the Department in September 1956.

In 1955, the Department received additional spacious rooms in the west wing of the original building (1903–6) of the Gordon Memorial School, and now occupies most of the first floor and part of the ground floor. The accommodation comprises a large lecture theatre with tiered seating to hold about ninety students, a small lecture room, a laboratory to seat twenty-six, a work room, an instrument store, a map store, staff rooms and a library containing the reference map collection which is administered as part of the Newbold Library. The number of students taking geography now exceeds 130, and preparations are being made for a three-year post-intermediate course to be introduced in 1957–8 to a syllabus equivalent to honours degrees in geography of British universities. J. H. G. L.

THE TERCENTENARY OF EDMOND HALLEY, F.R.S.

The tercentenary of the birth of Edmond Halley the astronomer fell on November 8 last. Halley was a man of parts, and much of his work, and not least his charts, are of interest to geographers. In furtherance of his studies in magnetism, he obtained from King William III the command of the *Paramour*, a pink, or narrow-sterned sailing vessel, and made two voyages in the southern Atlantic to observe the variation of the compass, 1698–1700. He embodied his results in charts, the first published in 1701, using what he called "curve lines" (*i.e.* isogonic lines) to join points where the declination had a given value of whole degrees, east or west. He was thus the originator of a graphical method of recording geographical distributions, which has since been used in numerous other sciences. In 1701 he examined thoroughly the English Channel in the *Paramour* and in 1702 published a valuable tidal chart.

The Society possesses an interesting set of Halley's charts; the following notes upon them are based largely on Professor S. Chapman's 'Edmond Halley as physical geographer' (*R. Astron. Soc.*, 1941) and a review of it in the *Geographical Journal* (98 (1941) 293–6), by A. R. Hinks, with a subsequent short note (*Geogr. J.* 99 (1942) 207) The first of his magnetic charts, which probably appeared in 1701, covered the "Western and Southern Oceans" (that is, the north and south Atlantic) only. The Society has two copies of this. One is a fine impression, taken before the dedication to William III had been engraved in the scroll. It has no imprint, but is signed "I. Harris sculp." The second copy is from a very worn plate; it has the dedication to William III, and, below the title, the imprint "Sold by R. Mount and T. Page on Tower Hill, London." It is also signed by Harris. The dedication implies that the original issue was not after 1702, the year of the King's death, but the state of the plate shows that this copy was pulled very much later. The absence of the dedication on the first mentioned copy suggests that it is an early impression taken perhaps in 1701.

Halley soon enlarged his magnetic chart to cover the whole world, supplementing his own observations from the journals of other navigators. The Society's copy of the "New and correct sea chart of the whole world showing the variations of the compass" differs in two respects from the reproduction of the first edition (1702) in the British Museum contained in Professor Chapman's paper. The British Museum copy has no publisher's name, and is signed "I. Harris sculp." The R.G.S. copy also has the engraver's name, but in addition the imprint, below the title, "Sold by R. Mount and T. Page on Great Tower Hill, London." The other difference is that

the R.G.S. copy is wider, the section from 90° E. to 160° E. being repeated on the left of the chart. Professor Chapman suggests that this was done when the chart became popular among seamen. The Society's copy is therefore a later issue from the emended original plate, probably before 1722, the year in which the bookseller Richard Mount died. No changes were made in the isogonic lines until 1729 when lines for the north Pacific and western South America were added. Then in 1744 they were brought up to date by William Mountaine and James Dodson, and the chart re-engraved.

As regards Halley's work in the English Channel, the Society has a chart in two sheets which is apparently an early issue. It is described in the title as ". . . shewing the Sands, shoals, depths of Water and Anchorage, with ye flowing of the Tydes and setting of the Current." There is an imprint "Sold by Mount and Page on Tower Hill London." A larger version, dated by A. R. Hinks from the stated change in the variation as *c.* 1744, is also in the Society's map collection. G. R. C.

THE MEETING OF THE BRITISH ASSOCIATION, 1956

The City of Sheffield proved a memorable meeting place for the British Association in 1956. The arrangements made for the reception and accommodation of its visitors were of the order only to be expected in a city whose boast it is that the words "Sheffield, England" on any product are a guarantee of the highest quality. The sharp contrasts between the industrial city and the lovely countryside immediately without its borders—Sheffield presents indeed "a dark picture in a golden frame"—provided ideal conditions for field study. The university and, in particular, the department of geography, proved a meeting place equipped with every possible facility. The total membership of the meeting reached 3370, the highest since the Liverpool meeting in 1953, and this was reflected in the consistently large attendances at the meetings of Section E.

Under the happy and resourceful presidency of Professor A. Austin Miller, the meetings of Section E were notably successful. Credit for this must go in large measure to Professor Linton and the members of the staff of the department of geography, whose arrangements for the welcome and accommodation of the Section were hardly to be bettered. Not only were the entire resources of the department placed at the disposal of the Section but an excellent exhibition illustrating the progress of geographical research work in the Sheffield region was arranged. Professor Linton also edited, with skill and discernment, the scientific survey, 'Sheffield and its Region,' that was issued to all members; this volume will certainly stand as among the finest of the many regional surveys produced for the Association in the post-war years. The success of the careful arrangements of Mr. I. S. Maxwell, the local secretary, may be gauged from the smoothness with which the affairs of the Section were conducted. In short, members gained the firm impression that the department of geography was inhabited by craftsmen not inferior in skill to their fellow citizens, the cutlers and steel makers, whose "touch turns metal into gold."

As is customary, the first day of the Section's activities was devoted to a study of the local region. Professor Linton's paper "The Sheffield Region" introduced the contrasts of upland and lowland conditions in relation to the situation and growth of Sheffield. Mr. A. J. Hunt, whose work as assistant to Professor Linton in the production of the scientific survey is worthy of special mention, contributed an account of the origins, growth and present character of the City of Sheffield and Dr. S. R. Eyre a study of "The historical geography of the East Moor of Derbyshire." Dr. Eyre followed his paper by an excursion, during the afternoon, to the East Moor, and this proved to be a model of its kind in demonstrating an approach to historical geography, particularly to problems of enclosure and field systems, by field study. Other parties profitably examined the urban and industrial landscape of the city itself.

Friday's programme was memorable for Professor Miller's presidential address on "The use and misuse of climatic resources" in which he surveyed the use and

application of climatic resources, especially the rain, the wind and the warmth of the sun, to the many pressing problems of our own age. The address was enthusiastically received and accorded considerable attention by press and radio. It is already printed in *The Advancement of Science* (Vol. 13, No. 50) and is worthy of close study, not merely by geographers. The Section, appropriately, devoted attention to the Peak District National Park and Miss J. V. Aucott's paper gave an account of the planning and development of the park and of its value to the neighbouring communities. During Friday afternoon three first-rate papers bearing upon problems of topical interest were read by Mr. H. Bowen-Jones on "The cultural landscape of Malta," by Mr. K. R. Sealy on "Land use in Cyprus and its interpretation from air photographs" and by Mr. R. W. Steel on "The Copper Belt of Northern Rhodesia." Valuable discussions followed these papers.

In accordance with the traditional pattern of Section E meetings, Saturday and Sunday were occupied by excursions. The Sheffield region is of rich geographical interest and the high standards of leadership increased the value of Saturday's studies in the High Peak (Mr. Savigear), the Ashover–Matlock country (Professor Linton), the Lincolnshire Wolds (Mr. Straw) and the South Yorkshire coalfield (Mr. Sibbons). Sunday's excursions were marred by inclement weather but no less than five excursions set out—to Creswell and Laxton (Mr. Maxwell), the Derbyshire Peak district (Dr. Garnett), the North Derbyshire coalfield (Mr. Hunt), the Hallam Moors and the Don Gorge (Professor Linton) and the Concealed Coalfield (Mr. Young).

Perhaps the highest point reached in recent years in the Section's meetings was attained on Monday when, throughout the day, papers related to the general theme "Climatology applied in the service of man" were read and discussed.[1] Professor Manley earned the gratitude of the Section and the press for his paper on "Climatic fluctuations and heating requirements," while Mr. M. Parry examined the effects of local variations of climate on the heating requirements of dwellings. Dr. Alice Garnett's paper on "Atmospheric pollution in relation to aspects of climate, relief and urban geography" was of special interest in the light of Sheffield's own atmospheric pollution problem and the morning concluded with some observations by Miss E. M. Frisby on her experience in the United States in providing climatological and forecasting services of value to industry. The afternoon papers were opened by Mr. G. Melvyn Howe on "The estimation of water need and the water budget in England and Wales" and Mr. S. Gregory on "Some practical applications of British rainfall studies." Professor B. J. Garnier examined moisture conditions and the water balance in Nigeria with a view to indicating areas where climate favours irrigation development and Mr. J. L. H. Sibbons offered new views on "The climatic approach to evapo-transpiration" in what may well prove an important paper. Professor Crowe opened a lively discussion to which a number of leading climatologists and meteorologists (including representatives from the Meteorological Office) contributed. It is and will continue to be the policy of Section E to institute discussions of this type in many fields of the subject to provide those actively engaged with a forum in which progress can be reviewed and common problems discussed.

Tuesday morning found the interests of the Section divided between the "Antarctic Research" joint session with Section C (Geology) and a group of valuable papers on social and economic geography. The Antarctic Research symposium proved to be even more popular than had been expected and an audience of over 500 heard Sir Raymond Priestley, the President of the Association, open the meeting. Sir Raymond's own address, delivered on the previous Wednesday evening, on "Twentieth century man against Antarctica" is of special interest to geographers. Dr. V. E. Fuchs opened the symposium with an account of the aims and problems of the Trans-Antarctic expedition, while among later contributors to the discussion were two representatives of Section E, Dr. D. H. Maling on "The geographical results of the

[1] An extended account of this symposium appeared in *Nature*, 178, 4536 (1956).

Falkland Islands Dependencies Survey 1944–55" and Mr. H. H. Lamb in a paper of absorbing interest on "Winds and weather in the Antarctic."[1]

It was a little unfortunate that the problems of Antarctic Research provided a strong counter-attraction to the topics on social and economic geography and it was a small but interested audience that heard the results of Dr. G. Joan Fuller's work in Santa Barbara, California, for which the Section is in Dr. Fuller's debt. Dr. Harry Thorpe contributed an excellent paper on "Heath reclamation in the Alheden district of Jutland 1770–1955" which is to be published shortly in the *Transactions of the Institute of British Geographers*. Mr. Leslie Symons contributed an account of "Economic changes in the hill and marginal lands," with special reference to Ulster.

It is a measure of the strength of Section E that on Tuesday afternoon, despite the attraction of a field demonstration by Mr. R. A. G. Savigear and Mr. R. S. Waters in which they illustrated and discussed developments in techniques of morphological mapping, good audiences were present to hear Mr. I. S. Maxwell present some of the results of his research work into "The Domesday geography of the Sheffield area" and Dr. H. C. K. Henderson's paper on "The agricultural geography of Derbyshire in the early nineteenth century."

Wednesday morning's papers on geomorphological topics attracted an audience of at least 100 who were rewarded by three valuable studies and discussions. Miss G. E. Groom presented an account of her work on "The Raised Beach in south-west Wales," while Mr. R. S. Waters and Mr. R. A. G. Savigear contributed, respectively, papers on "Differential weathering and erosion on 'oldlands'," and "Observations on Slope Development." The gratitude of all members of the Section is due to the contributors to this strong programme in which the standard of the papers and their illustrations reached a very high level indeed.

Members of the Association were entertained warmly by the city and university authorities and the concert given in the City Hall by the Hallé Orchestra will long be remembered. Section E met for dinner, as is usual, on Monday evening, in the Cutlers' Hall. The hospitality of the Geographical Association was much appreciated and members welcomed the invitation to tea on the Thursday and Friday and the opportunities provided to see over the Association's headquarters. We were glad to have as our official guests throughout the meeting Dr. Necdet Tunçdilek of the Geographical Institute, University of Istanbul, and his wife.

A report of this meeting of the Association would not be complete without a mention of the active discussion in which members engaged concerning the aims and future policy of the British Association. It became clear that the meetings of the Association now serve three purposes: (1) to offer a platform on which scholars and scientists may discuss their research work in all its theoretical complexity; (2) to encourage discussion in joint meetings with other sections of problems in related fields; (3) to provide also for non-specialists an annual stocktaking in intelligible language of progress in scientific research work, and to show the relevance of such research to the problems of the day. It is the intention of Section E to pursue these three aims, maintaining at all times the high standards of work and presentation so clearly evident at this year's meeting.

The meeting in 1957 will be held in Dublin from September 4–11 under the presidency of Professor D. L. Linton. It is hoped to devote a special session to the geography of Ireland which, together with an extensive field programme, may be of value in making Eire and its problems more widely known and appreciated. Offers of papers in all aspects of geography will be warmly welcomed and should be communicated immediately to the Recorder, Dr. M. J. Wise, at the London School of Economics and Political Science, Houghton Street, Aldwych, London, W.C.2.

M. J. W.

[1] Summaries of papers in the Antarctic research symposium are given in *Nature*, **178**, 4537 (1956).

THE ORDNANCE SURVEY ANNUAL REPORT

The Ordnance Survey Annual Report, 1955–56, contains much information of interest to map users. The revision for the production of the Seventh Series one-inch map is proceeding more speedily, and twenty sheets were completed. This revision is carried out at a standard which allows its use for the 6-inch and 1/25,000 maps also. A start was made on the resurvey of the Highlands by air survey and stereo-plotting equipment. Full cover will be given at 6 inches to 1 mile, as the proposed 1/25,000 cover was agreed to be inadequate. For new 6-inch plans, contours at 25 feet vertical interval are being surveyed by stereo-plotting equipment in moorland and mountain areas. A varied flying programme was carried out, which included the photography of 10,000 square kilometres for these 6-inch surveys.

The constant revision of large-scale plans is going ahead, 41 Constant Revision Sections being at work during the year, with 32,000 plans (1/1250 and 1/2500) under revision. In future, unless there are special reasons, the minimum interval between editions of large-scale plans will be five years, but an "advance information service" is being organized. The Report also records that successful experiments on traverse and levelling computing by punched card methods have been made, and that tests are being carried out on three dimensional plotting machines, including the Thompson-Watts first order machine. As regards publication, 32 sheets of the Seventh Series one-inch map were published, and it is hoped to cover Great Britain completely by 1960. It is interesting to note that an edition of 5000 copies of the third edition of the map of Roman Britain was exhausted in six months. Methods of production are developing markedly. "Scribing" has been introduced as a partial substitute for pen and ink fair drawing; tests for showing hill relief by the photography of three-dimensional models have been carried out, and mention is made of the photo-typesetter, designed in the Department, which produces higher quality lettering than the letterpress machines.

INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES

With the help of UNESCO the International Union for the Protection of Nature was founded in 1948, and has a secretariat in Brussels. The Union was founded on the initiation of the French government, and its present Secretary-General is Tracy Philipps, D.C.L., the first Englishman to be elected to the post. The fifth General Assembly of the Union was held this year in Edinburgh, the host organizations being the Society for the Promotion of Nature Reserves and the Nature Conservancy. It was agreed at the closing session that the title of the Union should be changed to "The International Union for the Conservation of Nature and Natural Resources (I.U.C.N.)" a title which emphasizes the "positive" function of conservation rather than the "negative" function of protection.

It was observed by E. M. Nicholson, Director-General of the Nature Conservancy, in a paper read at the assembly, that "it is urgent to lower the barriers between those working under different labels and banners in the field of nature conservation." This is most true, and it is a great pity that people working towards the same ends, in a field for which Patrick Geddes used the term "geotechnics," are in groups which tend to be mutually exclusive. Biologists of the older generation, particularly in this country, still largely ignore the work of geographers, and are often unaware of the significant ecological papers to be found in the geographical journals of various countries. Engineer- and architect-trained town and country planners have, until recently, appeared to think they could do without a knowledge of geography, ecology or sociology. Agricultural and forestry specialists (again one must regretfully add, particularly in Great Britain) have only recently come to realize that nature conservationists are their allies and not their enemies.

The technical side of the congress discussed four themes. Theme I was concerned with "The management of nature reserves on the basis of modern scientific know-

ledge"; Theme II was devoted to the spread of myxomatosis; Theme III concerned "The rehabilitation of areas biologically devastated by human disturbance." Theme IV, "The relationship of ecology to landscape planning," was the only one to which geographers had been invited to contribute, and these contributions were all primarily concerned with Scotland. Arthur Geddes discussed the Ordnance Survey Reconnaissance Vegetation Map of Scotland of which he was joint compiler with L. Dudley Stamp; Joy Tivy discussed ecological principles relevant to the planning of the Southern Uplands; F. H. W. Green's paper was concerned with research on mountain climates in Great Britain in relation to the ecology of land use. F. H. W. G.

A NOTE ON FORMER PEDIMENT REMNANTS IN HAUTE VOLTA

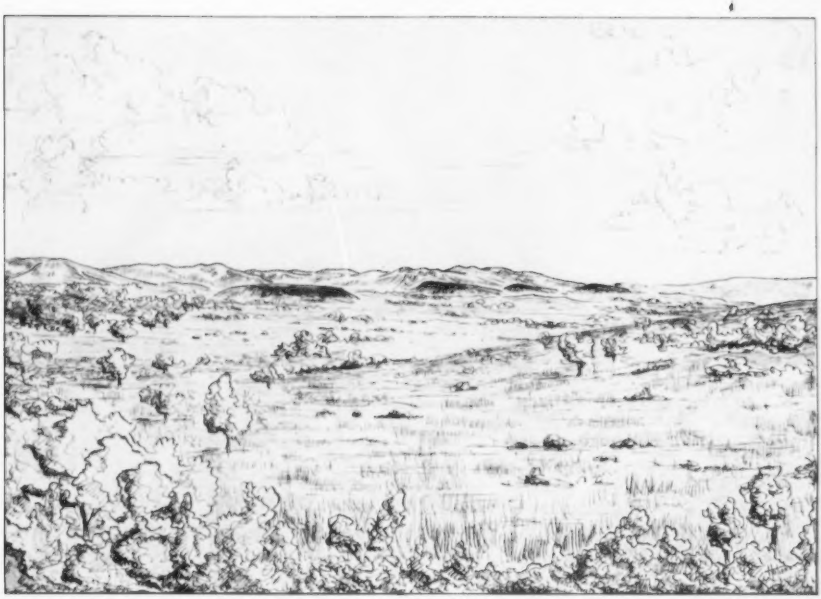
Mr. H. Brammer, Acting Director of the Gold Coast Department of Soil and Land-Use Survey, has recently made a study of certain geomorphological features in Haute Volta. This region is in French West African territory, and lies immediately to the north of the Gold Coast between lat. 10° and 15° N., and long. 5° W. and 2° E. It falls mainly within the Sudan climatic and vegetation zones. Mr. Brammer's visit is described in No. 9 of his Department's Technical Report series, 'Visit to Haute Volta, 30th January–3rd March, 1955,' which has been received for the Society's Library, and was reviewed in the *Journal* for September 1956, p. 382. The note which follows summarizes the main features of the pediment remnants to be found in Haute Vola.

"Three major erosion surfaces are recognizable in Haute Volta. Remnants of these are preserved by ironstone or bauxitic crusts (laterite) developed under the former peneplain conditions. The highest surface, at *c.* 2000 feet, caps a few Upper Birrimian basic greenstone ranges and possibly occurs over Palaeozoic sandstones on the Banfora escarpment. The intermediate surface, at *c.* 750–1000 feet, was apparently multiphase. Remnants are preserved on ironpan-capped buttes rising variously 5–20, *c.* 40 and *c.* 100+ feet above the youngest surface. The youngest erosion surface, at 650–750 feet in the east and centre rising to 800–1000 feet in the west, provides the greater part of the present topography, but evidence of recent slight dissection occurs along drainage lines here as throughout the Volta basin. No accurate dating is yet possible, but correlation with similar features in the Gold Coast suggests an early Tertiary age for the upper surface and late to post-Tertiary age for the intermediate and lower surfaces. The recent dissection is presumably attributable to Quaternary fluctuations in climate and vegetation, not of base-level.

"Ironpan-capped buttes at *c.* 40 and *c.* 100+ feet (intermediate surface) characterize many areas of Birrimian and Tarkwaian rocks (Archaean metamorphic amphibolite schists, phyllites, greywackes and quartzites). Cappings generally extend over only an acre or two, but a few may exceed 1 square mile. The edge of the ironpan crust and the 'case-hardened' surface of the exposed underlying lithomarge form a vertical cliff 5–50 feet high. Softer decomposed rock below this forms a steep slope (30°–45°) on which occur large cubic ironpan boulders fallen from the summit capping. Bouldery outcrops may occur in the lowermost 10–20 feet of the slope in the case of crystalline rocks. Occasionally, small ironpan-capped benches abut these slopes at 20–50 feet. At the foot, there is usually a sharp break of slope to the surrounding youngest erosion surface.

"Buttes in areas of Lower Birrimian rocks (phyllites, greywackes, subsidiary biotite schists) characteristically appear almost flat-topped. By contrast, summits of those in areas of Upper Birrimian rocks (basic greenstones, phyllites) characteristically show a pronounced slope, probably exceeding 10° at times. The higher end of these, with a cliff 5–50 feet high, may rise 50 to almost 200 feet above the surrounding peneplain level; the lower end sometimes almost merges into the latter, but more commonly surmounts it by 20–50 feet.

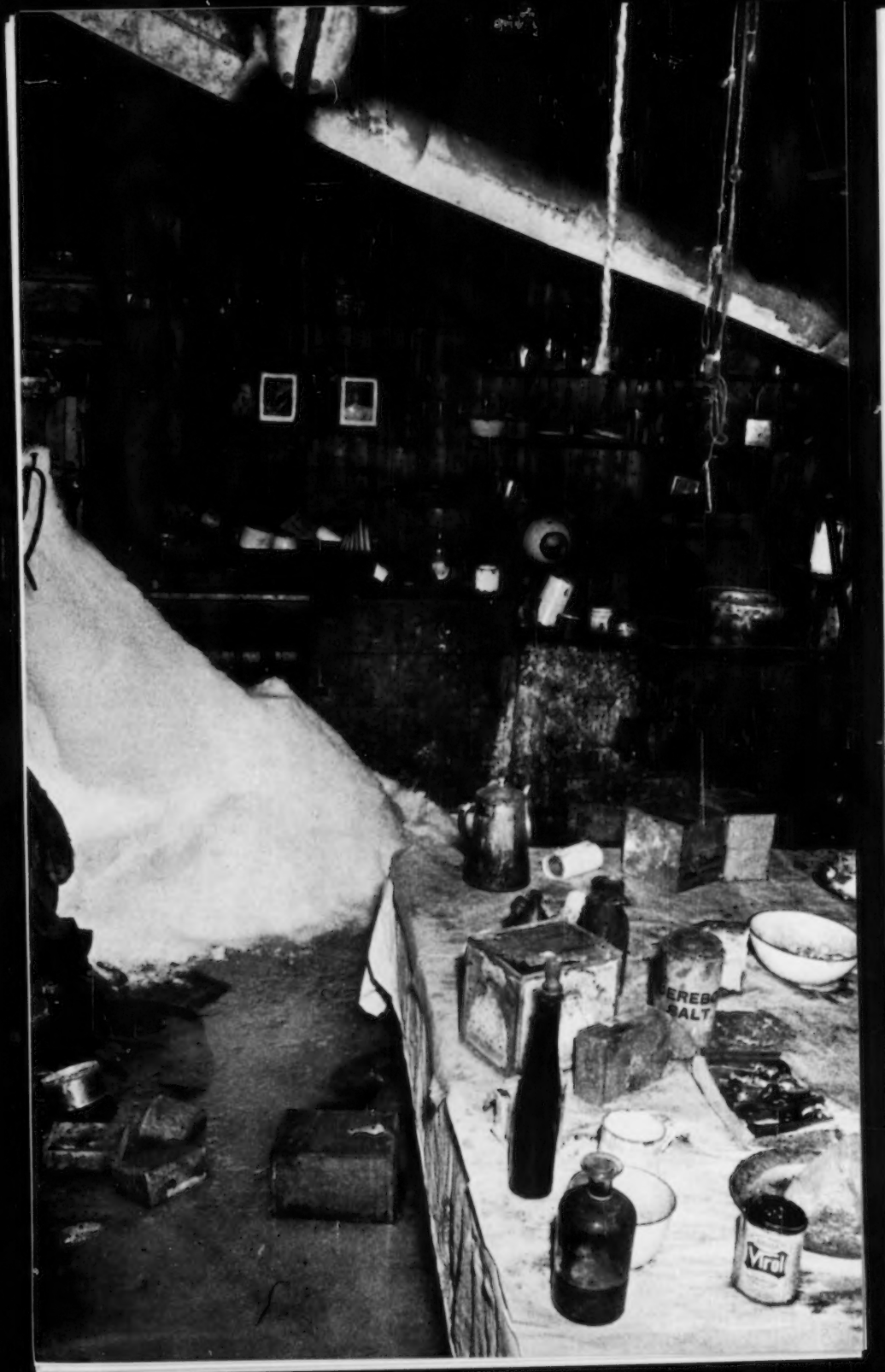
"These sloping-topped buttes appear to preserve remnants of pediments (or piedmont slopes) developed on the intermediate erosion surface. The highest edge



Series of detached, ironpan-capped buttes of intermediate surface with summits sloping away from Upper Birrimian range. Near Bani, Kaya-Dori road, Haute Volta

Drawings by J. McG. Hotson

Erosion surfaces near Lac de Bam, Haute Volta. Upper surface (c. 2000 feet) on summit of Upper Birrimian ranges in background; detached, sloping, ironpan-capped buttes of intermediate surface in middle distance; youngest surface occupying whole of low ground with ironpan sheet outcropping at c. 5–10 feet around edge of lake


SALT

often faces an inselberg of Upper Birrimian greenstones. In the case of inselberg ranges, a chain of buttes occurs on each side parallel to the range foot. In the case of less extensive inselbergs, buttes are concentrically disposed. Intervals between buttes vary from a few hundred yards to several miles. Summit cappings appear to be slightly convex upwards in the direction parallel to the inselberg and concave outwards perpendicular to it suggesting that the crusts may have developed within or beneath gentle alluvial fans.

"A gap of from half-a-mile to more than 1 mile now separates the buttes from the present day inselbergs. This represents the amount of scarp retreat between the end of the intermediate erosion cycle and the present day. In several cases, almost no trace remains of the inselberg which the pediments must originally have adjoined, and opposing chains of buttes overlook 1–2 miles of low topography forming part of the youngest erosion surface. Scarp retreat appears to have affected inselberg slopes more than those of buttes. The topography in the gap between them consists of opposing pediments (or piedmont slopes) running down to a central indeterminate drainage line. The relative widths of the two pediments vary, but the pediment adjoining the inselberg is usually the more extensive." H. B.

UNITED STATES DISCOVERIES IN ANTARCTICA, 1956

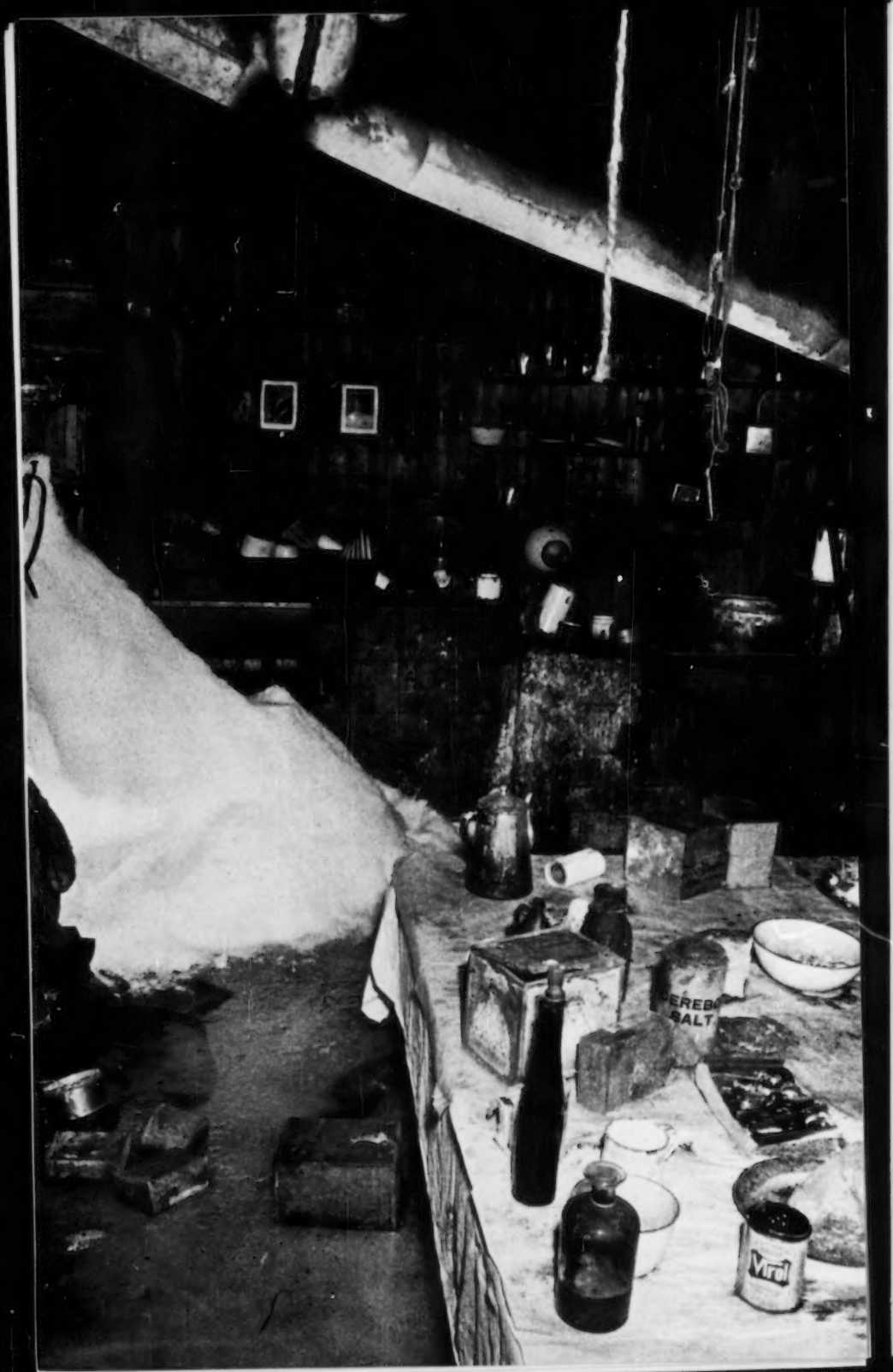
Mr. John Oliver La Gorce, President of the National Geographic Society, Washington, D.C., has sent to the Society the photograph which faces this page. The picture was taken in the course of the U.S.A. "Operation Deepfreeze," recently inaugurated in the Antarctic, and published in the National Geographic Magazine for August 1956. It has been presented to the Society's archives at the suggestion of Captain Richard B. Black, U.S. Navy, F.R.G.S.; another interesting Antarctic find by Captain Black was described in the *Journal* for June 1956, p. 278. This photograph shows the inside of the hut built by Scott on Cape Evans in 1911, which was last occupied by survivors of Shackleton's Ross Sea Party. Seven men were taken off from Cape Evans by Shackleton in the *Aurora* in January 1917, and the hut was left locked up. Thirty-nine years later, shore parties from Operation Deepfreeze were forbidden to enter, but photographs were taken by flashlight through a broken windowpane. This dramatic view shows wine, bread and cheese on the table, the food apparently preserved by the great natural refrigerator of Antarctica; a pot stands on the stove ready for cooking; King George V and Queen Mary appear on the wall; snow, choking all but this room, drifts through a chink. This year's visitors sealed the cabin as a memorial to Scott and Shackleton.

PRINCIPLES OF TRANSLITERATION IN USE IN THE SOVIET UNION

Soviet Russian maps and atlases which have recently appeared in this country have shown some fascinating and often amusing attempts to render British and other "foreign" geographical and place-names into Russian. It is perhaps valuable to examine some of the criteria used by the Russians in their transliterations and transcriptions. The Russians face one insuperable difficulty in the comparative inflexibility of the Cyrillic alphabet. Several letters of the Latin alphabet are not found in the Cyrillic or can only be represented by groups of consonants or vowels. Such groups are sometimes foreign to official Russian orthography or hard for the average Russian to pronounce. The attachment of a single sound value to each Cyrillic letter offers a further difficulty when one is faced with the several sound values which may be represented in a single letter of the Latin alphabet. Russian sounds seldom have an exact parallel in other languages. Soviet cartographers try to produce a transcription rather than a straight transliteration, making use of the phonetic nature of written Russian. The exceptions to this rule are, however, many. The result of this principle is often hard for a Western eye to recognize (*e.g.* ЛИ =*Leigh*) and the system falls down on occasions, so that the Russians are forced to offer alternatives (*e.g. Hull* is given

Scott's hut, Cape Evans, as left by Shackleton's Ross Sea survivors, 1917, and photographed during Operation Deepfreeze I, 1956

By courtesy of the National Geographic Society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Scott's hut, Cape Evans, as left by Shackleton's Ross Sea survivors, 1917, and photographed during Operation Deepfreeze I, 1956

By courtesy of the National Geographic Society

invariably in both the forms ХАЛЛ and ГУЛЛЬ). How many of us recognize ХОИК for *Hawick*? The phonetic system is frequently dropped if the resultant forms are too far from the original name: the Russians prefer to offer МАНЧЕСТЕР for *Manchester* rather than the phonetically more exact МАНЧЕСТЕ. The tolerably accurate phonetic rendering of *Norfolk* as НОФОК is abandoned in favour of a direct transliteration (НОРФОЛК). The phonetic system of transcription is advantageous where foreign names are difficult for a Russian to pronounce (*e.g.* УИЛСДЕН = *Willesden*, НОРИДЖ = *Norwich*, or ЛЕСТЕР = *Leicester*). The results of such work are often very far from the original form and prove a marked exception to the rule offered above. Double vowels and many diphthongs offer further hazards. For instance, in Yakut (the national language of the Yakut A.S.S.R.) ТАС is used to transcribe the words *tas* (outer) and *taas* (stone), with resultant danger of confusion. A phonetic transcription for Russians of the English words *ship* and *sheep* would, under the rules generally applied at present, be ШИП, somewhat confusing but easier for a Russian to appreciate than offering a direct transliteration of the latter word. Claims have been made recently to transcribe *Maas* and *Vaal* as МАС and ВАЛ to give a closer pronunciation guide for Russians than the forms used at present (МААС and ВААЛ), pronounced as *Ma|ás* and *Va|ál*. The English *W* and *TH* present problems. In most instances, the sound *W* is produced by Cyrillic combinations such as УИ (*ui*) and УО (*uo*), but in a number of "traditional" cases, it is rendered by the *V*-sound В, as in ВАШИНГТОН (Vashington = Washington). The sounds of *TH* are usually rendered by the Russian *T*, as in НОРТУИЧ = Nortuich (*Northwich*) and БАТ = Bat (*Bath*). The rendering of *Northampton* as НОРТГЕМПТОН is a little unhappy. Names such as *Hamburg*, *Huddersfield*, *Hagen*, and *Hannover* are offered, in the absence of an equivalent *H*-sound, as ГАМБУРГ = Gamburg (*Hamburg*), ХАДДЕРСФИЛД = Khaddersfild (*Huddersfield*), ХАГЕН = Khagen (*Hagen*), and ГАННОВЕР = Gannover (*Hannover*). At a recent conference held in Leningrad to discuss the problems presented in transliteration and transcription into Russian, claims were made for the abandonment where possible of forms foreign to Russian orthography: the name *Jöhstadt* rendered at present as ЙЁШТАДТ ought to be abandoned in favour of the orthographically more orthodox ЁШТАДТ.

Unlike trends in the West, the Russians stick tenaciously to conventional and traditional forms such as РИМ = *Rim* (*Rome*), ПАРИЖ = Parizh (*Paris*) and on occasions the strange БЭЙЦ-ЗИН for *Peking*. Some Russian conventional names savour of their German equivalents: НЕАПОЛЬ = Neapol' (Ger: Neapel for *Naples*) and ЛИССАБОН = Lissabon (Ger: Lissabon for *Lisbon*). There is a strange inconsistency in the use of prefixes: *New York* is transliterated directly into НЬЮ-ЙОРК, but *New Orleans* is given a Russian-language prefix and marked as НОВЫЙ ОРЛЕАН (Novyy Orlean). There is also a strong tendency to translate geographical names into Russian; examples are *Proliv La-Manzh* and its alternative *Angliskiy Kanal*, *Zaliv Kardigan*, *Grampianskiye Gory*, and the imposing *Yuzhno-Shotlandskaya Vozvyshennost'* for the *Southern Uplands*. The Russians frequently add a Russian-language geographical feature name to a native name already so equipped; an example is *Ozero Myuggel'zee* for the *Müggelsee*, while the Russian *Pustynya Sakhara* will find supporters among the West's *Sahara Desert* school. At other times we find Russian translations where we might expect a reproduced native name; *e.g. Bodenskoye Ozero* for *Bodensee*. Inconsistent treatment is found everywhere: *Mys Arkona* (*Kap Arkona*) but *Mys Kabo Blanko* (*Cabo Blanco*). We have *g.Everest* but the strange *g.Monblan*. The *Cape of Good Hope* is offered as *Mys Dobroy Nadezhdy*. The genitive case used in Russia for such features as *Mys Dezhneva* is seldom found applied to foreign names, which are kept in the nominative form. Here again practice is conflicting, and Russian sources say it is permissible to put foreign names into the genitive form where a feature is very large (*e.g.* for seas, large islands, etc.). It is said that even the handbooks for transliteration issued by the official State agencies are conflicting and seldom agree in practice between different areas. Where a feature name is given (*Cape*,

River, *Island*) it is usually set in lower case or small capitals. Attention has been given lately to the question whether traditional transcriptions of names should be extended to all related forms. The traditional rendering of СИДНЕЙ for *Sydney* (New South Wales) is replaced elsewhere by the phonetically closer СИДНИ. It is suggested that the solution is to issue standard lists of names, which might help to eliminate such inconsistencies as ГУДЗОНОВ ЗАЛИВ (*Hudson Bay*) and yet ХАДСОН-ФОЛС (*Hudson Falls*).

Russian cartographers have made several complaints about errors in many place-names derived from false transcriptions from foreign maps and sources and in a number of instances from incorrect foreign forms. The use of Latin forms of Chinese names has given considerable trouble, particularly those made by English scholars. A recent Russian atlas showed many variations from accepted English forms; as examples may be cited ЖЭХЭ=Zhekhe (English: *Jehol*), ВАНЬСЯНЬ Van'syan' (English: *Wanhsien*), ГУЙЛИНЬ Guylin' (English: *Kweilin*), ТЯНЬЦЗИН=Tyan'-tszin' (English: *Tientsin*), and many other variations. Even within the borders of the Soviet Union there is a lack of consistency and many discrepancies occur between lists published by various Ministeries. The principal gazetteering source is the 'S.S.S.R. Administrativno-Territorialnoye Deleniye,' but even this monumental work has its inconsistencies, while more exist between this and the similar publications for the Union Republics and lesser administrative units. In Kazakhstan, for example, both the forms *Kyzyl* and *Kzyl* are given as well as such mixtures as *Zhana/Dzhana* and *Zhol/Dzhol*, which produce such hybrids as *Dzhanazhol*. The lake *Ak-Kul'* is also given as *Akkol'*. Further complications arise in the use of a hyphen in words, but it is considered that the rules devised for literary use are not suitable for cartography. It is therefore the policy of G.U.G.K. (Chief Administration for Geodesy and Cartography) to write all names as units without hyphens. The rules at present in use have been devised largely by G.U.G.K., which has had a special department working on the problem since 1936. This department, which has been in close touch with geographers and linguists, has been expanded since 1950 into a standing commission on which are representatives of G.U.G.K., the Military Topographical Administration and the Headquarters of the Naval Forces. Over forty special "instructions" have already been issued, some based on work started by the Imperial Geographical Society as early as 1904. Many of these, as well as the "General instructions on the reproduction of geographical names" issued by G.U.G.K., have been criticized for their inconsistency. Recently the G.U.G.K. has recommended that the forms of names used on the imposing, new 'Atlas Mira' (the 'Bolshoy Sovetskiy Atlas Mira's' post-war successor), should be adopted for areas outside the Soviet Union, while the forms given on the 2nd Edition of the 1 : 1M Map of the U.S.S.R., issued by G.U.G.K., ought to be the standard usage for the Soviet Union. R. E. H. M.

NATURAL RESOURCES, FOOD AND POPULATION IN INTER-TROPICAL AFRICA

Professor Stamp has performed a valuable service in editing the report of the proceedings at the I.G.U. meeting held at Makerere College last year. We are particularly indebted to him in that no less than twenty-one papers and six excursions are recorded in about a hundred quarto pages. One wishes that such condensation were more common. This symposium was the first of its kind and is the outcome of co-operation between the Executive of I.G.U. and UNESCO. It resulted in a gathering of workers representative of most parts of inter-tropical Africa and their diverse interests and opinions are represented here. It is unfortunately impossible in a short review to comment on individual papers but one may indicate that the subjects dealt with range from strictly physical problems such as climate and physiography through agriculture and land use to urban and population studies. The papers represent, in fact, all aspects of recent thought on African (inter-tropical) problems and as such will be of interest to a wide circle of geographers. R. M.

INTERNATIONAL ASSOCIATION FOR QUATERNARY RESEARCH (INQUA)

The Fifth Congress of this association is to be held in Madrid and Barcelona from 20 September to 3 October 1957. The sessions of the Congress will be divided among a number of Sections, including: Climatic Pedology, Morphology, Glaciology, Hydrology, Palaeoethnology, Regional Quaternary, etc. There will also be reports from five commissions set up by the 1953 Congress in Rome: (*a*) Coast lines; (*b*) Dictionary of Quaternary terms; (*c*) Catalogue and correlation of the Pleistocene; (*d*) Recent tectonics and (*e*) Geological map of the Pleistocene in west Europe. Three long excursions are planned in addition to the short ones from Madrid and Barcelona. Before the Congress begins, two alternatives, each lasting eight days, are proposed, one in the Pyrenees and Ebro valley, and one in the Cantabrians and north coast. Between the earlier meetings of the Congress in Madrid and the later meetings in Barcelona, a six-day excursion to Alicante, Valencia and Mallorca is planned. The First Circular has now been issued and geographers who are interested should write to the Secretary, M. L. Solé Sabaris, Instituto Geologico, Universidad, Barcelona.

METROPOLITAN ST. LOUIS SURVEY

A notice has been received from the Director of the Research Staff of the Metropolitan St. Louis Survey. The Survey is financed by grants from the Ford Foundation and from the McDonnell Aircraft Corporation Trust to St. Louis and Washington Universities; it began in June 1956 and it is planned to complete the work by September 1957. It will consist of a series of comprehensive governmental, social and economic studies of the St. Louis metropolitan area, with particular reference to the City of St. Louis and St. Louis County. Proposals are to be prepared for consideration by a board of freeholders with the object of remedying major ills arising out of the present pattern of government, and of providing means of meeting present and future metropolitan needs. It is also hoped to furnish for consideration of citizens in other metropolitan areas an appraisal of methods, an analysis of the attitudes of metropolitan residents towards government, and an evaluation of campaign techniques. Student participation in each main phase of the project, and a formal seminar conducted by senior staff members, will have the effect of increasing the supply of research workers trained in the field of metropolitan government. The research design currently consists of six major types of investigation: governmental jurisdiction; functional services; finance and revenue; population, land use and economic developments; social areas; and citizen participation and interest in government.

The Metropolitan St. Louis Survey welcomes communications from individuals and organizations recently completing analyses or at present working in any of these fields of inquiry, or in allied areas of investigation. Correspondence should be addressed to John C. Bollens, Executive Officer and Director of Research, Metropolitan St. Louis Survey, 8147, Delmar Blvd., University City 24, Missouri.

SOVIET GEOGRAPHICAL SERIALS IN THE SOCIETY'S LIBRARY

Bulletin (Izvestia) of the Academy of Sciences of the U.S.S.R. Geographical Series 1956: 3 (May–June). Aeolian differentiation of matter in deserts, by A. V. Sidorenko. Basic laws of evaporation in steppe zones, by A. I. Budagovskii. The variation of species in relation to geography, by S. V. Kirikov. Some characteristics of the distribution of the machine industry in the U.S.S.R., by A. G. Omarovskii. The geography of atomic energy in the U.S.A. and Canada, by V. M. Gokhman. On the nature of tectonic movement in the Krasnovodak peninsula (East Caspian), by V. G. Richter. Geomorphology of recent movement in the Belokaminsk uplift (Volga basin), by M. V. Pronicheva. The development of certain forms of tundra micro-relief, by G. S. J. Konstantinova. The problem of statistical relationships existing between types of circulation of the atmosphere in the northern hemisphere, by A. Y. Pshenichnii. Geological and geomorphological investigations into Neolithic

man on the Kolyma water-course of the Indigirka river, by A. N. Tolstov. Reconstruction of the hydrographical network in the Bakhti river basin (north-west Central Siberia), by G. I. Amurskii. The 'Zavodskoi' manuscript atlas of 1777, by D. M. Lebedev. The physico-geographical regionalisation of the Donetz ridge as a natural zone, by V. S. Preobrazhenskii. The place of historical geography in economic geography, by V. K. Yatsunskii. Inner zones in economic regionalisation, by B. Y. Dvoskii. International geographical seminar in India and the contribution of Soviet geographers, by I. P. Gerasimov. Cartography in India, by K. A. Salishchev. Higher geographical education in India, by A. M. Ryabchikov. Geographical studies in Albania, by E. D. Silaev. Reviews of 'Transport and the distribution of industry,' by Khanukov; 'Problems of the geography of Kazakstan'; 'A service classification of American cities,' by H. J. Nelson (In 'Economic geography,' 1955(3)). Conference on soil erosion, by E. A. Mironov. The All-union Conference of Pedologists. Zoogeography at the first All-Union Ornithological Conference.

No. 4 (July–August). Academician V. A. Obruchev; obituary. The International geographical congress, by I. P. Gerasimov and others. Frozen wastes in the Antarctic, by G. A. Avsiuk and others. Recent oceanographic research in the north-west Pacific, by L. A. Zenkevich. Reciprocal action of component geographical media and matter-energy exchange, by A. A. Grigoriev. Water regime of the earth's surface, its role in the dynamics of natural processes and its transformation for practical purposes, by I. P. Gerasimov and others. Distribution of productivity of the U.S.S.R. in the sixth Five-Year Plan, by V. F. Vasiutin. Development and distribution of the productivity of Eastern Siberia and the tasks of economic geography, by V. A. Krotov. Complex studies of natural resources by the Academy of Sciences between 1915 and 1955, by L. V. Pustovalov. Indirect measurement of the force of sedimentation, by A. S. Devdariani. Geography in the European Peoples' Democracies, by N. F. Yanitskii. A French journal of geomorphology (Revue de géomorphologie dynamique), by Y. A. Meshcheryakov. The Oxford economic atlas of the U.S.S.R. and Eastern Europe, by P. M. Alampiev and others. Inter-University geographical excursions to France 1948–1954, by M. B. Gornung. Work in progress on regional economic geography of the U.S.S.R., by S. N. Ryasantsev.

Bulletin (Izvestia) of the All-Union Geographical Society of the U.S.S.R., Vol. 88 (1956), No. 3 (May–June). Movements of the banks of Baikal, by V. V. Lamakin. Changes in certain elements of the hydrology of the Baltic Sea, by I. V. Baranov. History of formation of the relief of Western Altai, by M. F. Rozen. Distribution of animal rearing in the Chelkaro–Igriz region (Kazakh S.S.R.), by A. F. Chernysheva. The abandoning of agricultural lands in the U.S.A., by L. Y. Ziman. Some urgent tasks facing Soviet geography, by O. A. Konstantinov. Limits of glaciation on the Russian valley, by A. M. Arkhangel'skii. First geographical knowledge of Ossetia (to beginning of 19th century), by V. L. Vilenkin. Pot-holes along the Belaia river (Caucasus), by M. I. Subbota. The 'bottle post' of the ice-ship 'Taimir,' by A. F. Lakionov.

Vol. 88 (1956), No. 4 (July–August). Main tasks of Soviet geography in the light of the decisions of the 20th Congress of the Communist Party, by V. B. Sochava. Geographical research in an Antarctic "oasis," by G. A. Avsiuk and others. Changes in the distribution of production in the U.S.S.R. during the Sixth Five Year plan, by O. A. Konstantinov. Geography and the teaching of geography in Yugoslavia (personal impressions), by B. N. Semevskii. The morphological structure of a geographical landscape, by K. I. Gerenuk. The basis and content of physical geography courses in pedagogical institutes of the U.S.S.R., by T. K. Tolokonnikova. The Petersburg–Peterhof canal project (18th century), by K. I. Shafranovskii. First economic atlas of transport in Russia, by A. I. Preobrazhenskii.

NOTES

THE ARCTIC INSTITUTE OF NORTH AMERICA (3485, University Street, Montreal 2, P.Q., Canada, and 1530, P Street N.W., Washington 5, D.C., U.S.A.) invites applications for its 1957 Research Grants, and also announces that money grants are available from the Banting Fund. Applications from Canadians receive priority in the latter case, and correspondence should be addressed to the Montreal Office. It is also announced that the full-time position of Executive Director of the Institute is to be filled and applicants, who must be prepared to live in eastern Canada, should write to the Montreal Office.

* * *

A pamphlet has been received from Auckland University College, New Zealand, entitled "LAND USE SURVEY," by James W. Fox, Senior Lecturer in Geography (Bulletin No. 49, Geography Series No. 1). Mr. Fox has given the subtitle "General principles and a New Zealand example" to his pamphlet, which consists of a disquisition on "The nature of land use," with references to as far back as Greek and Roman times; a more specific description of "The classification and survey of land use," with special relevance to New Zealand; and four appendices: "Definition of terms," "Meaning of symbols," "Classification of urban land use" and a table to show "A classification of rural land use in New Zealand." Two copies of the paper, which is illustrated by line blocks, are in the Society's library.

* * *

The first Memoir of the GEOLOGICAL SURVEY OF THE BRITISH SOLOMON ISLANDS is an account of the geology, mineral deposits and prospects for mining development by Mr. J. C. Grover, based on his first tour of three years. (Crown Agents, Milbank, 1955, 30*s*.) At present, though there are promising indications, there is no mining activity in the Protectorate. Though the report has been written with the mining engineer in view, it deals with topics of general scientific interest, *e.g.* the structure and seismic activity in the region, and is of value to the geographer.

* * *

The Gold Coast Geographical Association, founded in April 1955, has begun the publication of a bulletin, the first two issues of which, for January and July 1956, have recently been presented to the Library. The first issue was well received, so that it has been possible to widen the scope of the second to include short papers mainly on the geography of the Gold Coast. The Hon. Secretary of the Association is Mr. E. A. Boateng, University College of the Gold Coast, Achimota.

* * *

A comprehensive and very interesting exhibition, 'The Story of Surrey in maps,' arranged by the Surrey County Branch of the ROYAL INSTITUTION OF CHARTERED SURVEYORS, was held at the County Hall, Kingston-upon-Thames in September. Its aim was to illustrate the development of the County in the past four centuries and the history of the technique of the surveyor, land and topographical. Old surveying instruments and text-books were therefore included with terriers, plans and maps from the sixteenth century to the 'County Map' of 1951, prepared in accord with the Town and Country Planning Act, and the latest maps of the Ordnance Survey. The older material was drawn from the Surrey Record Office and the Guildford Muniment Room, and numerous public and private collections. The earliest original manuscript survey exhibited was a plan of the Manor of Betchworth, *c.* 1550. One of John Norden's carefully executed maps of Windsor Forest, 1607, from the Royal Library, Windsor Castle, was on display. The Exhibition, to which the Society lent three items, was opened by Sir John Hunt. A well-produced and usefully annotated catalogue was published by the County Branch, price 2*s* 6*d*.

* * *

OBITUARY

Engineer Vice-Admiral Sir Reginald Skelton, K.C.B., C.B.E., D.S.O., R.N.

Having been entrusted with the writing of an obituary of the above officer, I, in the capacity of being the only surviving commissioned officer of the 1901–4 National Antarctic Expedition, have undertaken this task with the greatest diffidence, and knowledge of my inability to set forth in any full measure a description of his unrivalled services to the expedition. My space in your journal being limited to those services, I am obliged to exclude mention of his subsequent brilliant naval career. I first made his acquaintance in 1900 in H.M.S. *Majestic*, flagship of the Channel Fleet, of which vessel he was serving in the rank of senior engineer, Captain Scott being first lieutenant and myself as sub-lieutenant. Captain Scott's hopes of commanding an Antarctic expedition were at that time in little more than an embryonic state, but he confided them to Lieutenant-Engineer Skelton and myself, with an offer should it ever come to pass, of our accompanying him. I am sure that Skelton jumped at the offer as eagerly as I did, but we were bound to silence with regard to the project until it should materialize into tangible form. Sir Clements Markham, a well-known enthusiast in geographical exploration and himself an old Arctic explorer, fathered the expedition, and from its inception became its mainstay. In due course Skelton and I received our appointments to the expedition, together with certain key individuals extracted from a then grudging Admiralty, as the organization of the expedition took shape and form. Upon this, and the manner in which the necessary funds were raised, space forbids me to touch.

Skelton, as Chief Engineer of the *Discovery*, attended her almost from the laying of her keel. The ship being equipped with an auxiliary engine, steam capstan, winches and many other mechanical appurtenances as her frame grew, it was due to his skill and foresight that Captain Scott was able to write in his book the 'Voyage of *Discovery*' "from first to last of our voyage we never had serious difficulty with our machinery or with anything concerning it."

As our voyage, following the usual sailing-ship route carried us into the higher southern latitudes, we fell in with many seabirds not all of which were well known except to expert ornithologists, and there was considerable competition in catching the rarer specimens following the ship. The means of catching them varied, and one of the most successful of us was our chief engineer, who to his messmates was known as "Skelly." After our arrival in Winter Quarters near the South West corner of Ross Island our first sledge journey was despatched on 4 March 1902 to place a conspicuous mark in the neighbourhood of Cape Crozier which would guide any possible relief ship to the position of the *Discovery* during the next southern summer. Among this party were Skelton and myself; the leader was our First-Lieutenant Charles Royds. Any reader of Captain Scott's 'Voyage of the *Discovery*' will learn of the redistribution of our party after a few days of very poor progress, and of the disaster attending the party on its return towards the ship under my charge. Among Skelton's many accomplishments was photography and he was recognized as photographer-in-chief to the expedition. He was indeed a man of many parts as witness the almost constant work of repairs, large and small, in progress in his chilly place of work down in the engine room during our two successive winters in the ice. His domain lacked the warm amenities of ward-room or mess-deck. Not only could he contrive the forging of heavy tools, but repairs to scientific instruments requiring skilled precision of work came alike to him. Skelton took an important part in several sledge journeys. He it was who discovered a breeding place of Emperor Penguins on a small area of fixed bay ice near Cape Crozier. Most of his sledge journeys were exploratory across MacMurdo Sound; and up the Ferrar Glacier,

which in a letter to me dated 23 March 1956 he describes as the most suitable route through the Western Mountains. I would I had space to remark further on this officer, describing further his vivid personality, his humorous disposition and exceptional reasoning power, lasting up till his end. A few years after our return in 1904 I enjoyed his company once more, when experimenting with motor sledges in Norway and the Alps. Captain Scott had asked both of us to come on his second expedition, but Skelton's career in the Royal Navy took prior place and I was obliged to refuse the offer, having found that the use of my hands was still impaired when handling metal in low temperatures. MICHAEL BARNE, *Captain, R.N. (retd.)*

OTTO YUL'YEVICH SHMIDT

Otto Yul'yevich Shmidt died in the U.S.S.R. on 7 September 1956. He was born in 1891, and was a university teacher of mathematics before the Revolution. After it, he held a number of senior civil service posts in various commissariats, and was then in turn Head of the State Publishing House [Gosizdat], Deputy Head of the Central Statistical Administration [Tsentral'noye Statistichesokoye Upravleniye], and a member of the State Planning Commission [Gosplan]. During this period he continued to be a professor of mathematics and published a number of important mathematical works. He was also a keen climber with an interest in glaciology. In 1929 he made his first arctic expedition, to Zemlya Frantsa-Iosifa. In 1930 he became Director of the Arctic Institute, and in 1932 was elected an Academician. In the same year he became the Head of the newly formed Government department created to develop the Arctic, the Chief Administration of the Northern Sea Route [Glavsevmorput']. He occupied this position for over six years, a period of rapid expansion and great activity in the Soviet Arctic. Shmidt himself led many expeditions, notably those in the *Sibiryakov* in 1932, the ill-fated *Chelyuskin* in 1933–34, and the establishment of Papanin's drifting station (later called SP-1) at the North Pole in 1937. In 1935 he visited Cambridge and established the first personal contact between Soviet explorers and the Scott Polar Research Institute. After his dismissal from the Northern Sea Route Administration in 1939—at this time of the great purges he was lucky only to be dismissed—he continued his scientific work, which included editorship of scientific journals and of the 'Bol'shaya Sovetskaya Entsiklopediya' [Great Soviet Encyclopedia], and turned his attention to problems of geophysics and astronomy. He was highly versatile, and a man of conspicuous ability. The strong position which the U.S.S.R. now holds in all fields of polar research and exploitation is in no small measure due to his work and influence. T. E. ARMSTRONG

VLADIMIR AFANASIEVICH OBRUCHEV

The death occurred in Moscow on June 19 of Academician Vladimir Afanasievich Obruchev, an Honorary Member of this Society since 1916 and Honorary President of the All-Union geographical society of the U.S.S.R. since 1947. Best known for his work as a geologist, Academician Obruchev also published many books and papers on his travels in Central Asia and Siberia, including a paper on the Yablonovi and Stanovoi ranges in Siberia in the *Geographical Journal* (Vol. 86 (1935), 422–40). Academician Obruchev was ninety-three.

CORRESPONDENCE

Meteorology and Antarctic Discoveries

H. H. Lamb and G. P. Britton suggest (*Geogr. J.* **121** (1955) 334) that a major elevation of the Antarctic continent is likely to exist at about 80° S., 80° E., and to run parallel with the 140th meridian, and that the extreme winds of Terre Adélie could be explained by the concentration of the air flow in a trough, possibly far in the interior, directed towards the Terre Adélie coast. In "United States discoveries in Antarctica, 1956" (*Geogr. J.* **122** (1956) 278) it is stated that this suggestion has been corroborated by the discovery of a great trough flanked by high mountains and that probably for the first time meteorological evidence has predicted a major geographical feature.

The information regarding this depression is still rather indefinite; at the moment (September 1956) the most authoritative statement is probably that of Byrd (*Nat. Geogr. Mag.* **110** (1956) 159) that near 82° S., 55° E., the ice cap rises to about 14,000 feet and that a shallow trough exists, sloping down from near the South Pole towards the Terre Adélie coast and spilling out cold air exists between this "hump" and the mountains of South Victoria Land. The existence of a high dome in the region farthest from the coast is not unexpected and had been suggested by Mawson thirty years ago ("Problems of polar research," *Am. Geogr. Soc., Spec. Publ.*, 7 pp., 262). A high surface of an ice cap can be caused either by an elevated rock base as in the crest near the mountain range south of the Ross Sea, or by the condition of accumulation, ablation and flow as presumably in the newly established dome. The same causes are responsible for the southern and northern domes of the Greenland ice cap respectively.

It has been repeatedly suggested before Lamb and Britton that the particularly strong katabatic winds of Terre Adélie and westernmost King George V Land are caused by the orography of the region. Meinardus repeatedly advocated this explanation by funnelling, but convinced himself that the available evidence (D. Mawson, 'The home of the blizzard,' 1915; *Geogr. J.* **80** (1932) 116) did not corroborate this idea and omitted it from his climatology of the Antarctic (W. Meinardus, "Klimakunde der Antarktis" in Köppen-Geiger, 'Handbuch der Klimatologie,' part IV U, 1938). Kidson makes the same suggestion in his summary of the meteorological results of Mawson's first expedition (*Austr. Ant. Exp., Sc. Rep.*, B.6, 1946, p. 74). But it is doubtful whether, as claimed by Byrd, the newly found depression leads in an unbroken slope from high latitudes towards the region of extreme winds which lies between about 138° E. and 144° E. With the width of the shallow trough of at least 600 miles suggested by Lamb and Byrd the region of particularly heavy winds would probably not be as restricted as it seems to be according to present knowledge. The travels on the ice cap in this region (*Austr. Ant. Exp., Sc. Rep. A.* 1; 'Carte de la Terre Adélie,' Institut Géographique National, 1955) give moreover no indication of a low position of the ice cap near the coast. One would rather expect that the wind flow would be concentrated and the speed greatest in the marked depression near the Mertz and Ninnis Glaciers further east; but the sledge journeys during Mawson's expedition 1911–13 (D. Mawson, 'Home of the blizzard,' 1915; *Austr. Ant. Exp., Sc. Rep.* B.V. part 3, 1939) suggest on the contrary lighter winds in this region.

In Terre Adélie the height of the ice cap surface already exceeds in 69° S. and 142° E. 1900 metres (B. Imbert, *Ann. de Geoph.* 9, 1 (1953)), whilst in 78° S., 148° E., it is only 450 metres higher (*Nat. Ant. Exp.* 1901–4, Meteorology, map). On the Greenland ice cap a fall of less than 3 feet per mile is too small, even in the trough between the two domes, to produce a katabatic wind comparable in strength to that in Terre Adélie around 69° S. (A. de Quervain and P. Mercanton, *Denkschr. Schweiz. Naturf. Ges.* **53** (1920)). One might even be justified in stating that the katabatic wind near the coast would be the stronger the more steeply the hinterland rises. This

is shown by bora-type winds in other regions and corroborated by aerodynamic considerations (F. K. Ball, unpublished). This effect is likely to be stronger than that of the concentration of the flow in a shallow, wide and possibly remote trough. For all these reasons it appears doubtful whether the depression found in 1956 can actually serve as an explanation for the unique wind conditions of the "Home of the blizzard."

It may incidentally be pointed out (*Geogr. J.* **122** (1956) 278) that the use of meteorological evidence by Lamb and Britton to predict a major geographical feature is not the first one. Already in 1909 Meinardus ("Die mutmassliche mittlere Höhe des antarktischen Kontinents," *Pet. Mitt.*, 1909, p. 304) used the seasonal pressure variations outside the Antarctic to calculate the mean height of the Antarctic continent. It is also well known that islands frequently cause isolated local clouds; this meteorological fact has repeatedly served in the discovery of islands, for instance Amanu Islands in the Tuamotu Archipelago ('Journal of José Andia y Varela,' Hakluyt Society, Series II, 36, part 2, p. 229) and Anchoret Island in the Admiralty Islands (L. de Bougainville, 'Voyage autour du monde,' Paris, 1771, p. 290).

Department of Meteorology, F. LOEWE
University, Melbourne, N3

1 *October* 1956

Mr. H. H. Lamb replies:

Meteorologists will be grateful to Dr. Loewe for his last paragraph, listing instances in which meteorological evidence and reasoning have been used in predicting geographical discoveries; but it is by no means clear why he is so anxious to disprove the validity of meteorological prediction of the Antarctic trough discovered by the present United States Antarctic Expedition directed towards the Adelie Land coast. Nor is his reasoning convincing. It can hardly be doubted that this trough has something to do with the unparalleled frequency (over 50 per cent. of the observations at one base) of gales, all from SSE., on the Adelie Land coast, and that the full explanation will become clearer when more of the geography is known. Certainly the circulation of the free atmosphere unaided by the surface geography could not conceivably produce such a near-permanent effect in one narrow sector.

Loewe's argument amounts to saying that the trough exists where Britton and I predicted it, but that it cannot explain the winds from which we ventured to assert its existence. It was admittedly unfortunate that the evidently rather crude newspaper account of the American discovery of the trough, as quoted in the *Geogr. J.* **122**, June 1956, p. 278, described the trough as "flanked by high mountains." The meteorological argument does not require this; and Britton and I had been most careful whenever alluding to the probable existence of a topographical channel in this region, as the explanation of the Adelie Land winds, to point out that the walls of the channel might amount to no more than the gradual contour of the ice cap itself—a "fold" or "ice-valley." It now appears that on the eastern side of the trough the upward slope of the ice is surmounted by the peaks of the S. Victoria Land mountains whereas the western side probably consists only of the upward slope towards the main "hump" of the ice cap much farther west.

What was in all probability original in our prediction of this topographical channel more confidently than Meinardus could dare to suggest it was the reasoning, by analogy from the only recently mapped frequency of gales in the Mediterranean, where topographical influences are prominent, that a channel *hundreds of miles in the interior* of Antarctica might be at work. I hope to present at a later date maps of gale frequencies in the Mediterranean and in the known regions of Antarctica (already shown at the British Association, Sheffield meeting in September 1956), which demonstrate conclusively that a trough such as has been discovered should markedly increase the frequency of gales on the sector of the coast towards which it is directed. Add to this the katabatic effect of downward slope of the ice and the fact that, unlike

the Greenland case mentioned by Loewe, it is the *prevailing* wind that pours through the channel: the SSE'ly gales in Adelie Land are then much less surprising. It remains only to account for the closer detail of which stretch of the coast feels the effect worst.

The dip between the northern and southern humps of the Greenland ice cap is shown by the U.S. Weather Bureau's "Normal Weather Maps of the Northern Hemisphere Upper Levels" to lie in a region of prevailingly light southerly or south-westerly circulation around the "cold pole" over the Canadian Archipelago. There is thus no obvious reason why the wind should blow through the gap. By contrast, the Antarctic trough south of Adelie Land lies in the prevailing southerly air stream around the mean anticyclone over East Antarctica (see, for instance, G. C. Simpson's map of probable Antarctic pressure distribution at 3000 metres in "British Antarctic Expedition: Meteorology, Vol. I. Discussion," Fig. 82, p. 262, Calcutta, 1919). Moreover, the floor of the Antarctic trough must slope and drain the cold air generally downwards from the South Polar plateau, whereas the Greenland case is a saddle (*col*).

Loewe's report by chance brings welcome news of the apparent confirmation of another prediction. Byrd's discovery that the ice cap rises to 14,000 feet in 80° S., 55° E. comes as near as I could wish it to confirming an earlier prediction of mine, also based on meteorological reasoning. In this *Journal*, in "Topography and Weather in the Antarctic" (*Geogr. J.* **111** (1948) 59) I stated that "the whole trend . . . of depression tracks . . . lends support to the belief in a topographical barrier in the interior of the continent of similar order of magnitude to the Alps or Rocky Mts., say 12,000 to 15,000 feet in height . . . (either) a great range of mountains or the main crest of the ice cap." Elsewhere on the same page I gave the position of this elevated feature as passing approximately NE.–SW. through 80° S., 80° E. This line passes within 100 miles of the position now observed by Byrd.

I am pleased to know that Mawson suggested a similar feature in broader terms thirty years ago: this reference was not available to me.

Finally, I would like to make it clear that I would be the last to belittle Meinardus's work, for which I have the greatest respect. Furthermore, I received personal encouragement from him in his old age with regard to my own Antarctic work. His prediction of the mean height of the Antarctic ice cap as long ago as 1909 from pressure variations outside the Antarctic, at a time when the meteorological network was far sparser than that at my disposal, was a remarkable triumph for meteorology; moreover his result still appears reasonably correct. It seems to me, however, that this calculation was different in nature from the predictions here discussed, since the actual existence of the ice cap was already known.

H. H. LAMB

Meteorological Office, Harrow,

11 *October* 1956

TRENDS IN THE GEOGRAPHICAL PATTERN OF DISEASE

I should like to point out that the history of the Lower Menderes valley to which Professor Leslie Banks refers (*Geogr. J.* **122** (1956) 167–75), is relatively well known and that this settlement area, together with that of the Little Menderes valley (Kaystros), is an excellent example of the important part played by geomedical factors in the evolution and transformation of urban and rural areas. Moreover, the close connection between malaria infestation and control, and such physical factors as river-deposition and change of coastline, and the reaction of different civilizations to a changing environment may fascinate the geographer.

Around the mouth of the Little and Big Menderes lay the Greek and Roman towns of Ephesos, Priene, Herakleia, Miletos and several smaller towns. The area was a settlement centre of great importance from pre-Ionian times onwards. Both rivers emptied their waters into deep navigable gulfs, the lower sections of rift

valleys dissecting the Menderes massif, which were followed by trade routes, Herakleia lay on the shores of a lateral gulf to the south of the Menderes mouth. As a result of deforestation and other factors these gulfs rapidly silted up. The port of Priene, for instance, was given up in the fourth century B.C. and the town was transferred to a fault terrace above the plain with its malaria-infested swamps. It was then $7\frac{1}{2}$ kilometres from the sea and is today 15 kilometres. The Menderes delta first filled up the northern part of the rift valley. Later, when the Menderes had shifted, the southern part filled up more rapidly. The gulf on which Herakleia lay was cut off from the plain by levees and transformed into lake Bafa.

Furthermore, the decline of the great antique powers, change of trade routes, earthquakes, political instability caused by the Central Anatolian tribes and the expanding Turkish Empires caused the depopulation of the area and the decline of its cities, except for a short revitalization under the Seljuks. The floodplain, the lateral swamps and lakes were the breeding places of Anopheles, and malaria killed, weakened and drove away the population of the lower Menderes valleys. From the late Middle Ages onward they were virtually abandoned. Largely pastoral villages of the Turks lay in the hills; the plains, where cultivated, were mostly settled by Greeks; small towns like Seljuk suffered heavily from malaria. It is interesting to compare the account of Philipson around 1900 with that of Freya Stark about fifty years later.

In recent years the picture has changed totally. The Greeks have been driven out and the river plains have been resettled by Turks (largely resettlers and displaced people from the Balkans and the Eastern Block countries) in a modern way. Irrigation and drainage schemes and the malaria-control squads of government are getting conditions under control. Malaria is rare now, and from new villages lined along the scarp base of the Menderes rift, extensive cotton and tobacco fields are farmed, largely with tractors. The worst menace still are the floods which render the lower Menderes plain impassable in winter and spring. The river can then only be crossed near Aydin. This means a severe isolation of the southern rim villages from the northern, which are linked by good all-weather roads to Izmir the port of the area. Active road building, and flood control, linked with the hydro-electric barrage now under construction in the Menderes area, should help to solve the problem.

Ankara, LIESA NESTMANN

5 *September* 1956

THE COAST OF S.E. ICELAND NEAR INGÓLFSHÖFDI

Dr. Cuchlaine King's papers are always well worth reading because she never fails to proceed from description to attempted explanation (see *Geogr. J.* **122** (1956) 241–6). The article in the June *Journal* is no exception. In it I have been constructively criticized for having attributed the formation of the offshore bar, which dominates so much of the south coast of Iceland, to a post-glacial fall in sea level from a 120-foot raised beach. Dr. King seems to doubt both the date and the existence of this beach because at one locality in the area she studied the 120-foot mark lies near the top of a well-developed inland cliff. This is, of course, a good point to make, but in the sentence before the one which Dr. King criticized I wrote that I was referring primarily to the coastline from Breiðamerkurjökull eastwards to Vestur Horn. The four 1 : 50,000 maps covering this area are 106 Lon S.V., 96 Heinaberg, S.A., 97 Kálfafelsstaður, N.A., and N.V. Had Dr. King examined this part of the coast she would have seen one of the finest examples of raised beaches in the world, one which maintains its altitude of approximately 120 feet for fully 30 miles. Where the extensive coastal plain meets every headland of the bounding basalt cliffs from Vestur Horn to Breiðamerkurjökull rock platforms occur, sometimes approaching a square mile in extent. They dominate the view of the plain as one rides slowly northwestwards towards Hofell. Such rock benches are not easy to date, but the sharpness of the angle between the bench and the cliff behind suggests a recent date, especially

in view of the rate at which the basalts with their soft tuff partings erode to form screes. Fortunately there is even clearer evidence than this both of the presence and recent date of formation of this raised beach.

A massive shingle embankment, in perfect state of preservation, extends westwards for about a mile and almost crosses the mouth of Laxárdalur where it merges into the coastal plain (106 Lon S.V.). This raised beach, far the finest example I have ever seen at such an altitude, can be located readily on the excellent Danish maps cited, as can so many of the associated rock benches, because the 40-metre contour wraps round and emphasizes them. This shingle embankment has been preserved from the active depredations of the Laxá because this river is locked within a gorge formed in a rock outcrop at which the embankment or spit ends. Further excellently preserved shingle beaches occur, at this same level, on the western side of the valley. In every case they are protected by rock outcrops where they would have been most exposed to marine—or to subsequent river—erosion. Extensive pebble flats, also marked on the map, lie seawards of the main embankment. The pebbles of these flats are all frost-shattered, and resemble sliced potatoes, whereas those forming the embankment itself are as rounded as the shingle on the modern beach at the entrance to Hornafjörður. Furthermore convex tongues, typical of storm wave breaching, bulge up-valley on the landward side of the bank at points where the frost-shattered gravel flats are absent, or nearly so, from the seaward side. All this suggests that the flats were already present when the bank was being built by the sea, and that the raised beach post-dated the severe climate of late-glacial times. I am grateful to Dr. King for this opportunity to give further evidence in support of my original brief reference to the 120-foot raised beach. The fact that it does not occur exactly at the 120-foot level in the area examined by Dr. King is not very surprising in view of Iceland's recent geological history which is marked by block faulting on an almost unprecedented scale. Dr. King quotes an estimate that 150 million tons of silt in suspension were carried down on to Skeiðarasándur by the single Jokulhaup of 1938, and adds rightly that large quantities of coarse material must also have been brought down. Such increments of load in addition to the seasonal deposits from the great melt-water streams, continuing over thousands of years would surely have depressed isostatically the solid rock platform beneath, quite apart from the associated volcanic activity. The most reasonable interpretation of this coastal plain area lying close against a considerable ice cap is that, like other areas which have geologically recently lost much or all of their load of ice, it has risen in post-glacial times, but that owing to the volcanic activity and unevenly distributed load of outwash gravels, the amount of uplift has varied somewhat from place to place.

Dr. King, ignoring this uplift, then considers that the off-shore bar has simply formed at the seaward fringe of the great outwash fans. With such an explanation I have much sympathy as I put it forward in this *Journal* (**102** (1943) 175–9), again briefly, when discussing the formation of lake shore features in Iceland. But I do not think that it is the true one for the great offshore bar, because although it would seem reasonable for Skeiðarasándur, it cannot account for the westward continuation of the bar off Hornafjörður. Here the bar does not lie at the seaward fringe of great outwash plains, but up to 10 miles seawards of them. The lagoons enclosed within the bar are not nearly as deep as their great size would suggest but they are true lagoons needing boats to cross them and containing the little harbour and approaches to Höfn, quite different from the shallows between Ingólfshöfði and the mainland. No, there must have been a substantial, and recent, fall in sea level for the 120-foot raised beach to be left as it is now high and dry 6–12 miles inland from the present bar. This bar has formed in water much too deep to be accounted for by the relatively small constructive waves to which Dr. King appeals. I think it more likely that the whole offshore bar is mainly due to this recent fall in sea level, and that the lagoon enclosed within it has steadily been infilled by outwash fans, leaving it in the state in which we find it today, open lagoons where the outwash fans are small or absent but

infilled lagoons where they are large. But I entirely support Dr. King in her search for the true and detailed explanation of the formation of such a bar, which we have not yet obtained; she has already contributed much to the study of sand bars.

Dr. King was too courteous to draw attention to a major error of mine in the paper she referred to. Viewing this composite wind and wave bar from the sea in 1932, in a severe storm, I mistook it for an enormous storm beach ridge. Fortunately I visited the area in 1937 and noted my error in time to include a correction slip in the bound volume of Iceland papers which included the same paper. However I welcome this further belated opportunity of correcting my mistake, and of very heartily supporting Dr. King's explanation of the wind bar except perhaps in one small detail. The wind bar is most asymetrically placed in the shelter of Ingólfshöfði, occupying only the landward third of the area of shelter. Also Dr. King's survey shows that its seaward face is far steeper than its landward face. May this not result from under-cutting by storm waves of excessive power which periodically remove the seaward portion of the wind bar and so leave it much narrower than it otherwise would be?

Department of Geography, W. V. Lewis
Cambridge,
October 1956

Dr. C. A. M. King replies:

Mr. W. V. Lewis has raised some interesting points in his reply to my paper on the coast of S.E. Iceland. It should be pointed out first that the paper refers only to the area actually visited and it was not intended to throw doubt on the existence of a raised beach at 120 feet elsewhere along the south coast of Iceland, where this beach is a conspicuous feature.

The important point appears to be that, in the area studied, the coast is prograding; whether this is achieved by a fall in base-level, or by deposition of outwash material, or both, seems of less importance in an explanation of the coastal type. In the area considered the significant fact is that the result is a low coastal outwash-plain, partially submerged, having a very gentle seaward gradient and composed of sand grade material at its seaward edge. If, as Mr. Lewis suggests, the bar was formed as a result of a recent fall in sea level and the lagoon so formed behind it gradually filled with sediment, this lagoon should get shallower with time. This supposes then that the bar formed in water which was deeper than it is now, which would surely make the formation of the bar more difficult to explain. It must be made clear that the explanation put forward was based on the evidence available in the area near Ingólfshöfði.

However, it remains true that there is still much to be learnt about the processes leading to the formation of offshore bars. It is quite possible that these are not all formed in a similar way; other factors may be of importance in the area to which Mr. Lewis refers, where the lagoon is deeper and the material size may differ. Particularly significant factors which are liable to vary are the amount of longshore movement and the size of material. Sand and shingle react differently to storm conditions. While it may be true that an offshore bar composed of sand may be the result of constructive conditions, one formed of shingle is more likely to be the result of storm waves. These can throw shingle well above the normal high water level, to form storm-ridges; on sand beaches, in contrast, storm waves tend to be entirely destructive.

With regard to Mr. Lewis' last point, referring to the possible undercutting of the wind bar by the sea, it might be pointed out that large climbing dunes reach almost to the top of the cliffs seaward of the wind bar on the west side of Ingólfshöfði. The wind bar has clearly not been touched by the waves during the time required for the formation of the climbing dunes, which is probably quite considerable.

Department of Geography, C. A. M. King
Nottingham,
November 1956

Meeting of 16 July 1956. The President in the Chair

Elections to Fellowship: Roger Banks; Henry J. Bell; John A. Booth; Mrs. Betty Buck; Richard Clark; Leslie P. Cummings; Miss R. A. S. Curtis; Charles W. Evans; Lieutenant-Commander Anthony D. Fletcher; Alan F. Fuller; Mrs. E. L. Gamble; Charles J. Grant, M.A.; James P. Hall; Robert A. Hall; Squadron-Leader D. J. Hammond; John M. Holmes; Evan Hughes; Miss Evelyn A. Hughes, B.A.; James Jackman; R. E. Jones; Milton F. Krause; Knud Lauritzen; Miss J. P. G. Lilwall, B.A.; A. W. Linfield; L. Robert Maby, Jr.; John W. Macnab, B.SC.; Arthur C. Mann; Miss Patricia Matthews; John Scott Muir; Stanley E. Robinson; Jeremy Roffey; Miss Rosemary L. Rolfe; Bharatendu N. Roy, M.SC.; A. C. W. Russell; Arthur Vandyk; William Wilson

Elections to Associate Membership: L. Johnsson; T. J. V. Mandeville

SESSION 1956–57

Meeting of 15 October 1956. Dr. E. Hindle in the Chair

Film: Nature reserves of the Congo–Nile Divide. Commentary by Tracy Philipps, Secretary of the International Union for the Conservation of Nature and Natural Resources

Meeting of 22 October 1956. The President in the Chair

Paper: Expedition to Gough Island. By John Heaney and Martin Holdgate

Meeting of 29 October 1956. Professor J. A. Steers in the Chair

Paper: Physique of Wales. By E. H. Brown

Meeting of 5 November 1956

Film: Voyage of the *Seven Little Sisters.* Commentary by William Willis

Meeting of 6 November 1956. The President in the Chair

Paper: Twenty-five years of Mesopotamian discovery. By Professor M. E. L. Mallowan, F.B.A. Anniversary lecture of the British school of Archaeology in 'Iraq

Meeting of 12 November 1956. The President in the Chair

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Elections to Associate Membership: Alan Clark; Miss Judith Oppenheim; Miss Elizabeth M. Pott; Donald H. Ratledge; D. J. L. Robinson; Miss A. Stewart-Smith

Paper: Operation "Deepfreeze I." By Lieutenant-Commander M. J. N. Foster, R.N. An account by the British liaison officer of this year's United States Antarctic Expedition

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THE ROYAL GEOGRAPHICAL SOCIETY

KENSINGTON GORE, LONDON, S.W.7

FELLOWSHIP AND ASSOCIATE MEMBERSHIP

The object of the Society being the Promotion and Diffusion of Geographical Knowledge, it has always welcomed to its Fellowship those anxious to further this object by their interest and support, as well as those able to take a more active part in the work of discovery and exploration.

FELLOWSHIP

The Bye-Laws provide that a candidate for admission to the Fellowship of the Society must be proposed by a Fellow personally known to him and seconded by another Fellow. Further, that a candidate is not eligible until he (or she) is twenty-one years old, unless he holds a Commission in Her Majesty's Forces or he (or she) is a matriculated student of a University of the United Kingdom or the Self-Governing British Dominions. Proposal forms can be obtained on application to the Director and Secretary.

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A pamphlet giving details of the Society and a copy of the Charter and Bye-Laws will be sent on application to the Director and Secretary.

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